ELECTRONICS FOR MEASUREMENT • COMPUTATION • TELEMETRY • CONTROL

INSTRUCTION MANUAL
for
VOLTAGE CONTROLLED OSCILLATOR
MODELS GOV-5 & GOV-5C

DCS DATA-CONTROL SYSTEMS INC.

Instrumentation for Research

Commerce Drive, Danbury, Conn. 06810 Telephone: 203-743-9241 TWX 710-456-2596

Digitized by the Internet Archive
in 2025

https://archive.org/details/manualsplus_10476

ERRATA SHEET

MODEL GOV-5, INSTRUCTION MANUAL

DOCUMENT NO: 671019
ERRATA: No. 2 (superceedes all previous errata sheets)
DATE: September 8, 1972

Page 5-1/5-2
Delete Paragraphs 5-12 and 5-13 and replace with the following:

5-12. PREAMPLIFIER BALANCING.

5-13. To balance the preamplifier proceed as follows:

a. Remove the GOV-5/G from the GOV-5 and connect the GOV-5 to the GMA through the GTF-2.

b. Ground both inputs of the GOV-5 by connecting Pins 1, 2 and 5 of the GTF-2.

c. Connect frequency counter between Jack 19 and 5 (Ground) of the GTF-2.

d. Turn all equipment on and allow a 15 minute warm-up period.

e. Note the frequency indicated by the frequency counter.

f. Put a jumper across Pins 1 and 2 of the GOV-5/G on the master board.

g. Note the frequency indicated by the frequency counter.

The frequency noted in steps e and g should be approximately the same. If not; adjust the Balance Potentiometer (R229) until they are.

INSTRUCTION MANUAL

VOLTAGE CONTROLLED OSCILLATOR

MODEL GOV-5 & GOV-5C

DATA-CONTROL SYSTEMS, INC., EAST LIBERTY STREET, DANBURY, CONN.

COMPOSITION PAGE

INSTRUCTION MANUAL

VOLTAGE CONTROLLED OSCILLATOR

MODELS GOV-5 & GOV-5C

This instruction manual consists of the following pages:

Title Page	
Composition Page	A
Front Matter	i to iii
Section I	1-1 to 1-9
Section II	2-1 to 2-3
Section III	3-1
Section IV	4-1 to 4-8
Section V	5-1 to 5-3
Section VI	6-1

This material is the property of Data-Control Systems, Inc., and is furnished for the installation and operation of DCS products only. Reproduction of these contents or use for any commercial purpose without prior permission is forbidden. All rights in this material are reserved.

DOCUMENT NO: 671019 PUBLICATION DATE: 10/67

TABLE OF CONTENTS

SECTION		PAGE
I	GENERAL DESCRIPTION	1-1
1-1	Introduction	1-1
1-3	Purpose of Equipment	1-1
1-7	Physical Description	1-1
1-9	Electrical Description	1-1
1-16	Functional Description	1-4
1-20	Performance Specification	1-4
1-21	Test Equipment and Special Tools	1-9
1-23	DCS GTF-2 Test Fixture	1-9
II	INSTALLATION	2-1
2-1	General	2-1
2-3	Unpacking and Handling	2-1
2-6	Mounting	2-1
2-10	Lubrication	2-1
2-11	Cooling	2-2
III	OPERATION	3-1
3-1	General	3-1
IV	THEORY OF OPERATION	4-1
4-1	General	4-1
4-3	Preamplifier Stage	4-1
4-5	Limiter/VCO Driver	4-1
4-10	Voltage Controlled Oscillator	4-3
4-14	Output Amplifier	4-3
4-16	Autocal Control	4-3

SECTION		PAGE
V	MAINTENANCE	5-1
5-1	General	5-1
5-3	Inspection	5-1
5-6	Cleaning	5-1
5-8	Lubrication	5-1
5-10	Minimum Performance	5-1
5-12	Preamplifier Balancing	5-1
5-14	Gain Module Performance	5-2
5-16	Troubleshooting	5-3
VI	DRAWINGS	
6-1	General	6-1

LIST OF ILLUSTRATIONS

Figure	Title	Page
1-1	Model GOV-5/C Voltage Controlled Oscillator	1-2
1-2	Model GOV-5 Components	1-3
1-3	GOV-5 Block Diagram	1-4
2-1	Typical Example of Rack Cooling	2-3
4-1	GOV-5 Functional Diagram	4-2

LIST OF TABLES

Table	Title	Page
1-1	Test Equipment and Special Tools	1-9
5-1	GOV-5 Minimum Performance	5-3
6-1	Parts List	6-2

SECTION I

DESCRIPTION AND LEADING PARTICULARS

1-1. INTRODUCTION.

1-2. This manual provides installation instructions, operating instructions, theory of operation, maintenance instructions, parts list and drawings drawings for Voltage Controlled Oscillators, Models GOV-5 and GOV-5/C. The GOV-5/C has automatic calibration capability. Figure 1-1 shows the GOV-5/C. The oscillators were designed and are manufactured by Data-Control Systems, Inc., East Liberty Street, Danbury, Connecticut.

1-3. PURPOSE OF EQUIPMENT.

1-4. The GOV-5 is an FM Modulator that converts transducer-produced voltage to frequency. Its frequency deviation is determined by the peak-to-peak amplitude of the input signal and its sweep rate is determined by the frequency of the input signal.

1-5. The output of the GOV-5 can be transmitted, recorded on magnetic tape, or read directly on an analog meter.

1-6. The GOV-5 mounts in one module space of Data-Controls Systems GMA-1 or GMA-3 housing assembly where it receives cooling air, power, and signal interconnection.

1-7. PHYSICAL DESCRIPTION.

1-8. The GOV-5 is a solid state, aluminum enclosed module with an Elco connector at its rear. It is 1.14" wide x 3.39" high x 10.38" long and weighs approximately 18 ounces. Figure 1-2 shows the GOV-5 with its plug-in units: Gain Unit GOV-5/G and Filter Unit GOV-5/F.

1-9. ELECTRICAL DESCRIPTION.

1-10. The GOV-5 is a high quality, floating differential input, voltage controlled oscillator (VCO). It has excellent common mode rejection, stability, and linearity over a wide frequency and input level range.

1-11. Center frequencies from 200Hz to 2.0 MHz with ±1% to ±40% deviations are accomplished by GOV-5/F frequency unit.

1-12. Full bandwidth deviation for input levels from 500 millivolts to 10 volts is accomplished by GOV-5/G gain module and front panel GAIN adjustment.

Figure 1-1. Model GOV-5/C Voltage Controlled Oscillator

Figure 1-2. Model GOV-5 Components

Channel Frequencies, Deviations and Input Levels: Center frequencies from 200Hz to 2.0MHz with deviations from ±1% to ±40%, capable of accepting input levels of .05 to 10 volts peak-to-peak.

NORMAL OPERATING RANGE:

Channel Frequencies and Deviations: Center frequencies from 390 Hz to 1.5 MHz with deviations from ±4.7% to ±16%.

Input Impedance: Each input is isolated from ground by greater than 1000 megohms shunted by less than 60 pf. The floating differential input impedance is nominally 2000 megohms.

Input Level: Standard Gain Modules, Model GOV-5/G, accept 500 millivolts, 1 volt, 2 volts, 3 volts and 5 volts peak-to-peak for full bandwidth deviation. The front panel 10-turn GAIN control provides overlapping ranges when used in conjunction with the standard GOV-5/G Gain Modules.

Maximum Signal Plus Common Mode Voltage: All specifications are met with a peak signal plus common mode voltage of ±10 volts.

Maximum Safe Input Voltage: Input voltages of ±50 volts will not cause damage.

Input Offset: The input offset current is less than 20 picoamps. The differential offset voltage referred to the input is less than 250 microvolts.

Input Polarity: When input terminal #1 is negative with respect to input terminal #2, the frequency increases.

Noise: The equivalent input broad band RMS noise is less than 0.1% of FBW with a 1 K source impedance.

Deviation Limiting: Deviation is limited to less than 20% of full bandwidth beyond upper or lower bandedge for a 200% bandwidth input. (Limiting to less than 10% of full bandwidth is available on special order).

Common Mode Rejection: With up to 100K ohms of input source unbalance, the common mode rejection is greater than 60 db at DC. With no source unbalance, the CMR is greater than 40 db at 20 kHz with the sensitivity control at maximum.

Linearity: Within 0.05% of FBW of the best straight line.

Outputs: The output voltage at the two outputs are adjustable by means of a front panel level control.

FM Output: (Filtered Summing Output) Short-circuit proof. Floating output nominally 170 millivolts RMS from 200 ohms.

FM Output: (Record Level) Unfiltered output nominally 2 volts peak-to-peak.

Amplitude Modulation: The sine wave output contains less than 3 db of AM, for full bandwidth deviation at a modulation index of 5. (Less than 1 db available on special order).

Output Distortion:

(1) Less than 0.5% for any harmonic.

(2) Intelligence components are less than 0.1% for modulation indices of 1 or greater.

Temperature Coefficient: 50 ppm/FBW/°C, plus 50 ppm/Fc/°C for frequencies of 15 kHz and greater. For center frequencies of 390 Hz to 15 kHz, the temperature coefficient is 50 ppm/FBW/°C plus 100 ppm/Fc/°C.

Intelligence Bandwidth: DC to 500 kHz for all standard input signal levels. (.5to 5 volts peak-to-peak).

Intelligence Response: Within 3 db of DC response for modulation index of 1.

Overload Recovery: Output of the input amplifier will recover to within 1% of FBW in less than 10 microseconds for a 1000% input overload. (±50 volts, maximum).

TEST POINTS AND CONTROLS

Gain Control: Front panel 10-turn screwdriver potentiometer for adjusting the deviation sensitivity. On units with Auto-Cal provisioning (GOV-5C), the screwdriver slot contains a leaf switch which actuates the calibrate system.

Zero Control: Front panel 10-turn screwdriver potentiometer for adjusting the output subcarrier frequency. On units with Auto-Cal provisioning (GOV-5C), the screwdriver slot contains a leaf switch which actuates the Calibrate system.

Output Level Control: Front panel screwdriver potentiometer for setting the output levels.

Offset Switch: Three-position switch for offsetting the frequency to upper or lower bandedge or at band center, for zero volt input. Located on side of chassis.

FM Output: Front panel test jack for monitoring the unfiltered output. Located on the GOV-5/F.

Ground: Front panel ground test jack located on the GOV-5/F.

POWER REQUIREMENTS:

Approximately 3 watts, distributed as indicated.

+35 V at 24 ma ± 20%
+18 V at 27 ma ±20%
-18 V at 27 ma ± 20%
-35 V at 36 ma ± 20%

All voltages supplied from GMA- Module Assembly with DCX-6 Power Supply.

Line Voltage Stability: In conjunction with the DCX-6 Power Supply, the shift in center frequency for a 10% change in line voltage is less than 120 ppm of center frequency.

TEMPERATURE RANGE:

Operating: 0°C to +55°C with circulating air.
Storage: -55°C to +90°C.

DEMENSIONS:

1.14" wide x 3.29" high x 10.38" long.

WEIGHT:

Approximately 18 ounces.

MOUNTING:

Mounts in one module space of GMA- Module Assembly.

CONNECTORS:

Compatible to GMA- Module Assembly through Elco connector.

RFI PROVISIONS:

The GOV-5 was designed to meet the intent of MIL-I-618D, when used in conjunction with the DCS Model GMA- Module Assembly.

CALCULATED MTBF:

Thirty-Five thousand (35,000) hours, based on MIL-HDB-217A.

* Due to the extensive channel selection available with the Model GOV-5, it is not feasible to describe the performance capabilities for the entire subcarrier frequency range. DCS therefore, specifies a Maximum Operating Range and a Normal Operating Range. All performance charac-

teristics contained herein relate directly to the channels within the Normal Operating Range. When channel selection is not within the Normal Operating Range, DCS should be consulted regarding individual specifications and operating characteristics.

ORDERING INFORMATION

SPECIFY:	(A)	Wide Frequency Range Voltage Controlled Oscillator. Model GOV-5 Model GOV-5C if Auto-Cal option is desired.
SPECIFY:	(B)	Gain Module. Model GOV-5/G (FBW Input Voltage) Example: GOV-5/G (500 millivolts)
SPECIFY:	(C)	Frequency Determining Plug-in Unit. Model GOV-5/F (Center Frequency and Deviation) Example: GOV-5/F (100 kHz ±15%)

1-21. TEST EQUIPMENT AND SPECIAL TOOLS.

1-22. The test equipment and special tools required to maintain the GOV-5 are listed in table 1-1.

Nomenclature	Manufacturers Type No.
Oscilloscope	Tektroniz Type 575 or equivalent
Frequency Counter	TSI Type 511A or equivalent
DC Power Source	Power Designs Model 2003 or equivalent
VTVM	RCA Voltohmyst WV-98 or equivalent
Test Fixture	DCS GTF-2

Table 1-1. Test Equipment and Special Tools

1-23. DCS GTF-2 TEST FIXTURE. The jacks on the side of the GTF-2 correspond to the connectors that mate with the GMA on the GOV-5. The outline drawings in section VII give the pin connections tabulation.

SECTION II

INSTALLATION

2-1. GENERAL.

2-2. This section provides information for the installation of the Model GOV-5 prior to operating the unit.

2-3. UNPACKING AND HANDLING.

2-4. The unit is sealed in a moisture proof polyethelene bag and wrapped in Kimpack insulation to absorb shock during shipment.

2-5. Remove the corrugated carton and protective covering and perform a general visual inspection. Examine the unit for damage such as broken controls and indicators and exterior damage to the aluminum case. If any damage is noticed, notify the carrier and DCS immediately.

2-6. MOUNTING.

2-7. The unit fits into a single compartment of a GMA-1 or GMA-3 Module Assembly and should be inserted in the space labelled "GOV-5" on the front bottom lip of the GMA. To install the unit in the GMA proceed as follows:

a. Assemble the proper GOV-5/F and GOV-5/G plug-in units to the Model GOV-5.

b. Locate the GOV-5 top and bottom projecting edges into the GMA grooves and slide the unit in.

c. Tighten the retaining screw on the GOV-5 front panel until the GMA and GOV-5 Elco pins mate.

2-8. Signal interconnections and wiring within the GMA Module Assembly are shown on the GMA type drawing in Section VII, if required.

2-9. Each GMA Module Assembly is equipped with a muffin fan which pressurizes the unit to approximately 0.2 inches of water and forces cooling air over the GOV-5 and other units in the Module Assembly.

2-10. LUBRICATION. If the GMA Module Assembly is used in temperatures exceeding 110°F or in areas of severe vibration, the muffin fan should be lubricated at least once a year to ensure reliable performance. To lubricate the fan, proceed as follows:

a. Remove cap from end of oil injector.

b. Place needle at the center of circle marked on the Gold Label.

c. Position the needle at an angle of approximately 45° to the surface of the label and tangent to the perimeter of the circle.

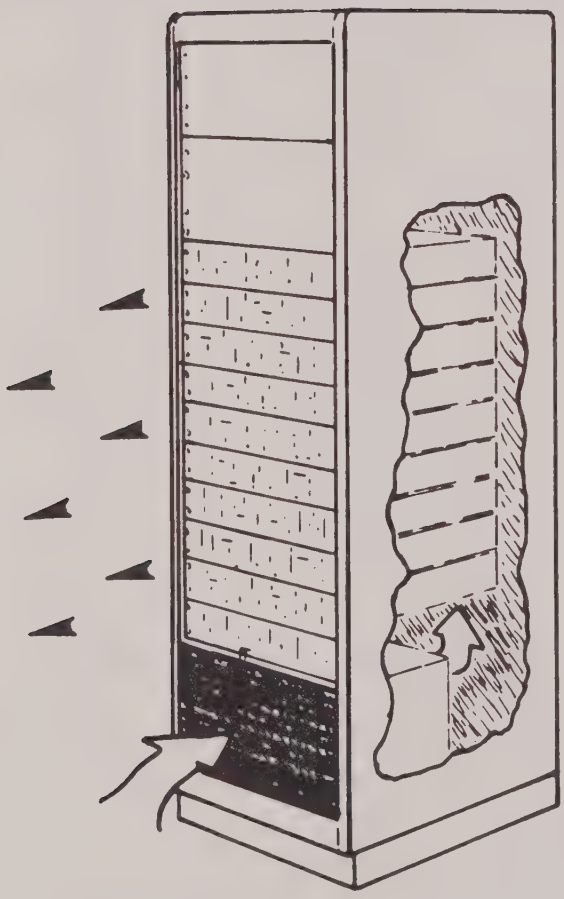
d. Pierce the label and concealed self-sealing rubber cap located under the label.

e. Insert the needle approximately 1/4".

f. Depress the plunger of the OIL INJECTOR slowly to allow approximately 1/8" of oil to escape.

2-11. COOLING.

2-12. Cooling within the rack is accomplished through use of a blower assembly at the base of the cabinet. See Figure 2-1. Adequate pressure is obtained by plugging all vents and holes and directing air flow through the unit and out through the crevices in the front panel.



Air flow is 40 cfm per GMA 1. Installation shall be semi-pressurized to approximately 0.2 in. of water to permit cooling by air flow over and around units.

Figure 2-1. Typical Example of Rack Cooling

SECTION III

OPERATION

3-1. GENERAL.

3-2. The GOV-5 will operate once it is adjusted and installed. Installation procedures are given in Section II. For adjustment procedure, perform the minimum performance procedure in table 5-1.

SECTION IV

THEORY OF OPERATION

4-1. GENERAL.

4-2. The description in this section is keyed to GOV-5 functional diagram (figure 4-1) and the schematic diagrams in Section VII.

4-3. PREAMPLIFIER STAGE.

4-4. The preamplifier consists of two amplifier pairs with FET inputs arranged as a differential amplifier. Each side of the differential amplifier is similar to an operational amplifier with feedback through R206 for one side and R207 for the other. Q206 and Q207 are connected as zener diodes to provide +22V DC for Q202 through Q205. CR201B protects Q202 and Q203 from excessive reverse bias during overload. The gain network is connected from source of Q201A to source of Q201B and determines the gain by setting the amount of output which is fedback. Balance potentiometer(R229) compensates for VGS differences between the two FET'S. GAIN potentiometer (R135) controls the output level of the preamplifier.

4-5. LIMITER/VCO DRIVER.

4-6. The differential voltage appearing across the GAIN Control network is applied to the inputs of the limiter/VCO driver. The differential amplifier consists of 4 pairs of compounded transistors and the current source (Q212 and Q213) which supplies a constant 2.2 ma. Limiting action is accomplished when the voltage across the amplifier inputs exceeds the total resistance between the Q208 - Q209 emitters times 1.1 ma.

4-7. The CF OFFSET switch (SW-2) provides the capability of setting the VCO to center frequency, upper bandedge or lower bandedge references. When the switch is in CF position, 1.1 ma flows through each side of the amplifier. This current, flowing through the ZERO pot resistance and R130, produces a voltage at the VCO Input which biases the VCO to run at CF. With the switch set at the +1/2 BW position, unequal currents flow in each side to bias the VCO to upper bandedge frequency with no signals applied. Similarly, the lower bandedge frequency is obtained when the switch is in the -1/2 BW position.

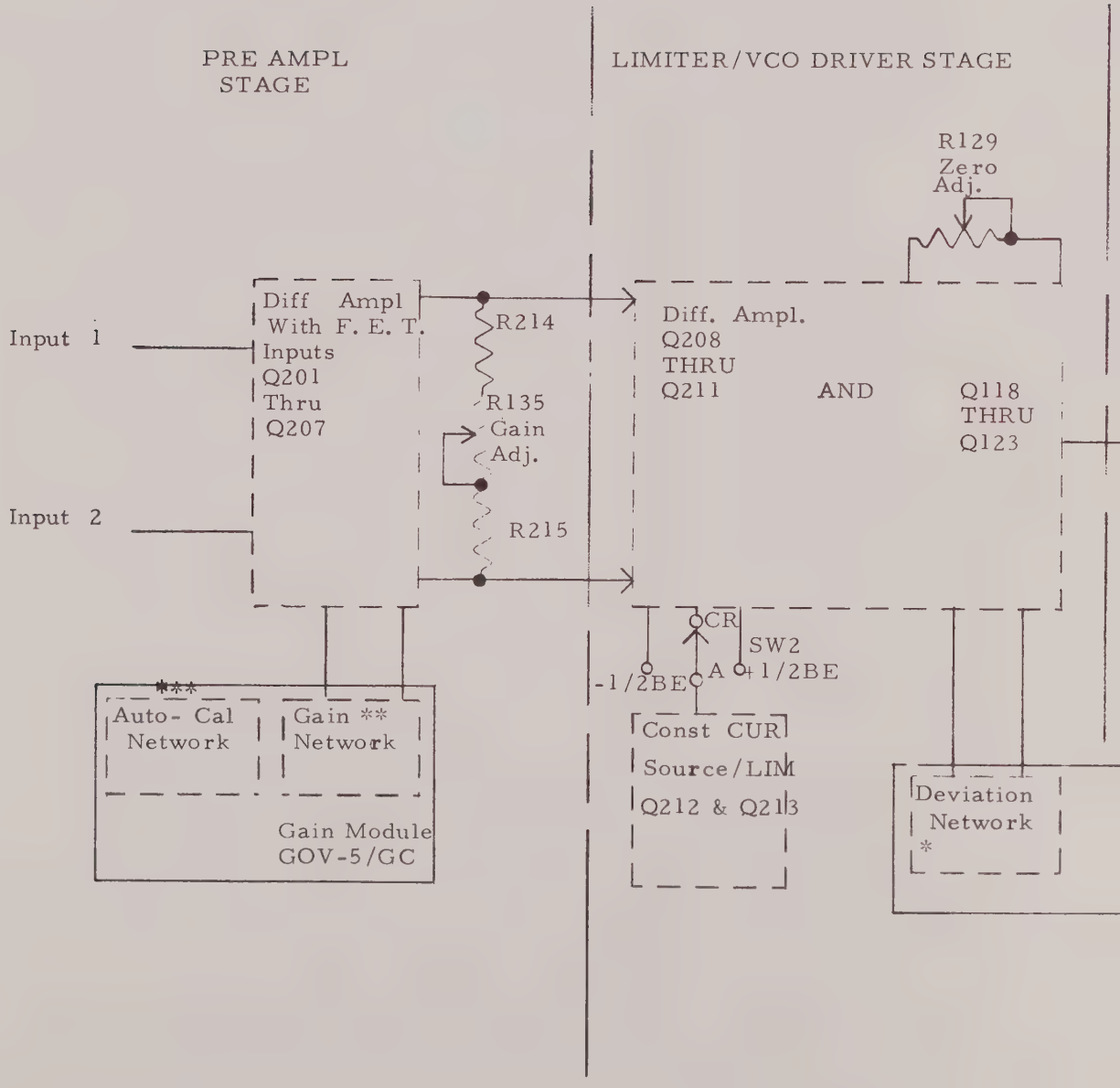
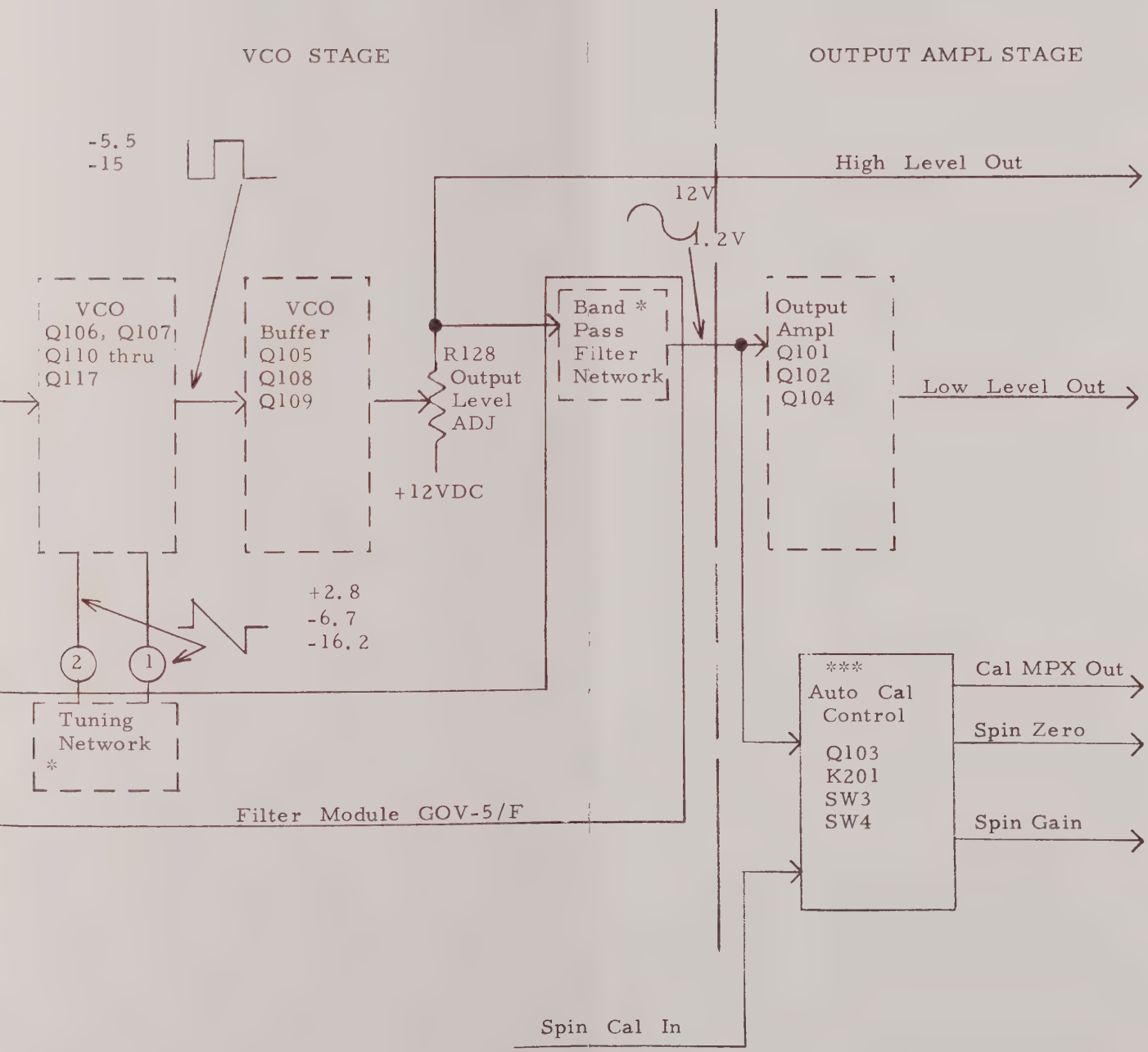


Figure 4-1. GOV-5

* Frequency/Sensitive Components Characteristics depend on customer specification

** Value depend on customer specification

*** GOV-5/C ONLY



nctional Diagram

4-8. The deviation of the VCO is determined by the deviation resistor in the tuning unit between terminals 5 and 6. This resistor determines the collector load of the differential amplifier and therefore determines the gain. With higher gain, more voltage swing is produced for a given input signal, and therefore when this swing is supplied to the input of the VCO, greater excursions from CF are produced. With the open circuit, the amplifier would produce maximum deviation and with the short, the amplifier would produce no deviation. The deviation resistor, with values between open and short conditions, determines the limits of the single-ended output voltage of the VCO driver.

4-9. Q118 and Q119 are temperature compensating diodes.

4-10. VOLTAGE CONTROLLED OSCILLATOR.

4-11. The single-ended VCO Driver output deviates the VCO frequency. When the VCO Driver output is -24 volts DC nominal, the VCO oscillates at center frequency which is determined by the value of the timing capacitor in the tuning unit between terminals 1 and 2. Sensitivity of the VCO is a 10% change in frequency for each 0.9 volt deviation from -24 volts DC. The VCO is an astable, free-running multivibrator producing a square wave output.

4-12. A buffer amplifier, consisting of Q105, Q109 and Q108, isolates the VCO from successive stage disturbances and loading. The OUTPUT LEVEL control adjusts the square wave amplitude fed to the filter. The high level square wave output at the FM Test Point and Elco output pin is taken directly off the OUTPUT LEVEL control input to the bandpass filter.

4-13. All harmonics except the fundamental sinusoid of the square wave spectrum are attentuated in the bandpass filter which removes undesired harmonics from the VCO square wave output. The bandpass filter is contained in the GOV-5/F plug-in tuning unit.

4-14. OUTPUT AMPLIFIER.

4-15. This amplifier consisting of phase splitter Q102 and complementary symmetry push-pull pair Q101 and Q104 provides 160 MV rms FM sine wave for summing buss application.

4-16. AUTOCAL CONTROL. This control circuit consists of independent ZERO and GAIN microswitches with relay K201, CF OFFSET switch and diodes CR101, CR102, CR103A, CR103B, CR104, and Q103. Communication to the AUTOCAL system is provided by the SPIN ZERO, SPIN GAIN, SPIN CAL and CAL MPX OUT terminals. When either microswitch is depressed

The relay is closed to flag the AUTOCAL equipment which produces a precise calibration signal into the input plug-in GOV-5 AUTOCAL - Servo gun circuit to automatically flag the adjustment program and activate the adjustment error detector in the AUTOCAL unit.

SECTION V

MAINTENANCE

5-1. GENERAL.

5-2. This section contains inspection, cleaning, lubrication, minimum performance, troubleshooting, and voltages for the GOV-5.

5-3. INSPECTION.

5-4. Inspect front panel controls and cover for any damage which may have occurred during shipment.

5-5. Inspect all internal subassemblies for physical signs of damage such as broken or leaky components, burned or charred spots on resistors or capacitors, and loose or oxidized soldered wires.

5-6. CLEANING.

5-7. Since cooling air is constantly flowing through the equipment, the main blower in the rack should be properly filtered. Corners and bottom of the rack should be cleaned periodically. The panel and cover of the Model GOV-5 may be cleaned with a solvent such as carbon tet. Clean interior parts with air.

5-8. LUBRICATION.

5-9. Refer to paragraph 2-10.

5-10. MINIMUM PERFORMANCE.

5-11. The GOV-5 minimum performance is given in table 5-1. Before trouble-shooting, attempt to balance the preamplifier. The procedure is given in this section. If successful, repeat the minimum performance.

5-12. PREAMPLIFIER BALANCING.

5-13. To balance the preamplifier proceed as follows:

a. Remove GOV-5/G from GOV-5 and connect GOV-5 to GMA through GTF-2.

b. Connect frequency counter between jack 19 and 5 (grd) of GTF-2, turn all equipment on and allow 15 minutes warm-up time.

c. Note the frequency indicated by the frequency counter.

d. Put a jumper across the GOV-5/G pins on the master board.

e. Note the frequency indicated by the frequency counter.

The frequency noted in steps c and e should be the same. If they are

not, adjust BALANCE potentiometer (R229) until they are.

5-14. GAIN MODULE PERFORMANCE.

5-15. Measure the resistance of GOV-5/GC. The resistance shall be in accordance with GOV-5/GC plug-in board assembly, drawing BA-016022 in Section VII.

5-16. TROUBLESHOOTING.

5-17. If the minimum performance tests determine the unit is not operating properly, check the voltages and waveforms on schematics in Section VII.

5-18. When attempting to isolate malfunctions, make maximum use of jacks on GTF-2 and comparisons with known working units.

	PROCEDURE	REQUIRED PERFORMANCE
1	Connect GOV-5 to GMA with GTF-2.	None
2	On GTF-2: a. Interconnect jacks 1, 2, and 5. b. Connect frequency counter between jacks 19 and 5 (grd). c. Connect oscilloscope between jacks 6 and 20 (Low).	None
3	Turn on all equipment. Allow 15 minutes warm-up time.	None
4	Set GOV-5 CF OFFSET SWITCH to CF position and vary OUTPUT LEVEL control.	Oscilloscope shall display a sine wave varying in approximate amplitude between 0 and 160 mv rms.
5	Set OUTPUT LEVEL adjustment at desired output level.	None
6	Adjust ZERO adjustment for GOV-5 center frequency. NOTE: for GOV-5/C, use servo-screwdriver.	Frequency counter shall indicate GOV-5 center frequency.
7	At GTF-2: Disconnect jack 1 from jacks 2 and 5; connect a negative d-c power source between jacks 1 and 5 (grd) and set for 1/2 deviation voltage.	None
8	Adjust GOV-5 GAIN adjustment for high bandedge-GOV-5 center frequency plus deviation frequency. NOTE: for GOV-5/C, use servo-screwdriver.	Frequency counter shall indicate GOV-5 high bandedge.
9	Set GOV-5 CF OFFSET SWITCH in +1/2 BW position.	Frequency counter shall indicate GOV-5 center frequency approximately.
10	Reverse the power source at jacks 1 and 5 of GTF-2.	Frequency counter shall indicate low bandedge approximately.
11	Set GOV-5 CR OFFSET SWITCH in -1/2 BW position.	Frequency counter shall indicate GOV-5 center frequency approximately.
12	Set GOV-5 CF OFFSET SWITCH to desired position and disconnect test set-up.	

Table 5-1. GOV-5 Minimum Performance

SECTION VI

DRAWINGS

7-1. GENERAL.

7-2. This section contains drawings for the GOV-5. The drawings included are as follows:

OUTLINE DRAWINGS

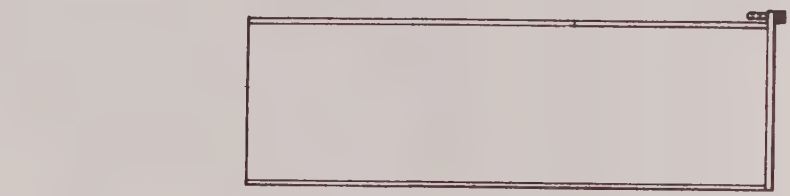
CO-015869	GOV-5/C
CO-016063	GOV-5
CO-015874	GOV-5/F

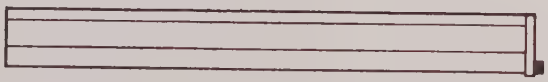
SCHEMATICS DRAWINGS

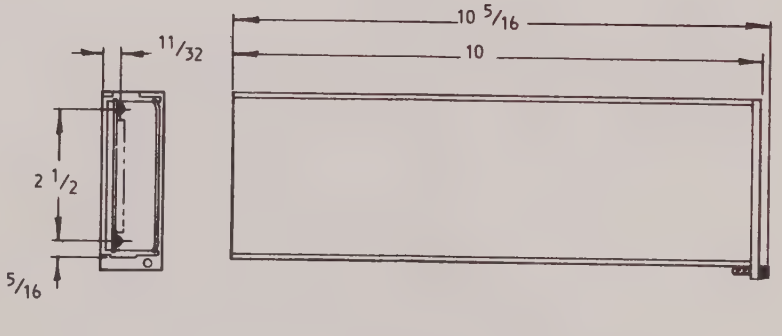
RW-016062	GOV-5/C
RW-015868	GOV-5
CW-015769	GOV-5/F

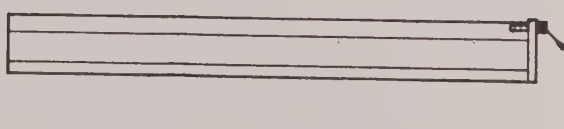
ASSEMBLY DRAWINGS

GA-015789	GOV-5/C Master Board
TA-015790	GOV-5/C Preamplifier Board
GA-016017	GOV-5 Master Board
TA-016018	GOV-5 Preamplifier Board
BA-016022	GOV-5/GC Plug-In Assembly
BA-015873	GOV-5/F Typical Timing Board Assembly
BA-016025	GOV-5/F Typical Band Pass Filter Board Assembly






10 5/16
10
11/32
2 1/2
5/16
1 3/32
59/64


MODULE

TABULATION, PIN CONNECTIONS	
PIN NO.	DESCRIPTION
1	INPUT A NORMAL
2	INPUT B NORMAL
3	+35
4	+12
5	GND
6	SUM OUT
7	-12
8	-35
9	+18
10	-18
11	
12	+ 1/2 BANDWIDTH
13	- 1/2 BANDWIDTH
14	CENTER FREQUENCY
15	SPIN ZERO
16	SPIN GAIN
17	SPIN CAL
18	
19	HI LEVEL OUT
20	SUM LEVEL OUT (GND)

NOTES:

1. THE GOV-5 PLUGS INTO THE DCS MODEL GMA-1 OR GMA-3 MODULE ASSEMBLY. ALL POWER AND SIGNAL CONNECTIONS ARE MADE FROM MODULE ASSEMBLY GMA-1 OR GMA-3 TO GOV-5 VIA ELCO CONNECTORS AS TABULATED.
2. PIN CONNECTIONS ARE NUMBERED FROM TOP TO BOTTOM.

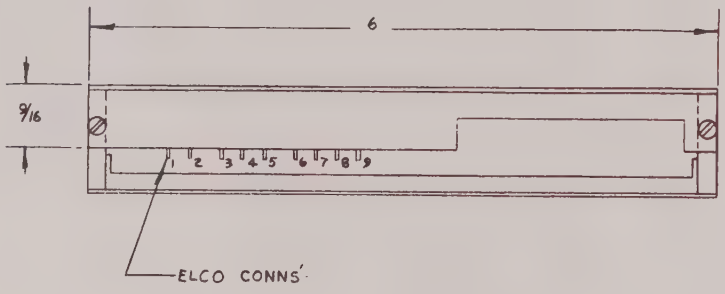
3.29

1 1/8

E LOCK

DATA CONTROL SYSTEMS, INC.	TITLE: OUTLINE DRAWING		
TOLERANCES: UNLESS OTHERWISE SPECIFIED DECIMAL - 3 PLACE ± .005 DECIMAL - 2 PLACE ± .010 FRAC. ± 1/64 ANG. ± 0° 30' FLATNESS WITHIN ~/~ IN. FRACTIONAL HOLES -0. ± 1/64 NOTE: BREAK ALL SHARP CORNERS .005"-.015" SURFACE ROUGHNESS NOT TO EXCEED ▽	DWN. D.J.	DATE 4/20/67	DO NOT SCALE DRAWING
	CHKD. [illegible]	5/1/67	MAT'L
	ENG. [illegible]	5/1/67	FINISH
	APP. [illegible]	5/1/67	CO-0160-03 / REV. B
	SCALE		SHEET

REV.	ZONE	DESCRIPTION	DATE	DWN.	CHK.	APP.



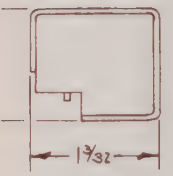
REF.	DESCRIPTION	QTY

GOV-5/F
PRODUCT

OGILVIE PRESS, INC.
ULYSSES, NO. 40000

ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY. ASSY.

TABULATION, PIN CONNECTIONS	
PIN NO.	DESCRIPTION (B. P. F. SECTION)
1	Timing Capacitor
2	Timing Capacitor
3	Ground
4	B. P. F. Input
5	Dev. Sens.
6	Dev. Sens.
7	+18 Volts
8	+12 Volts
9	B. P. F. Output

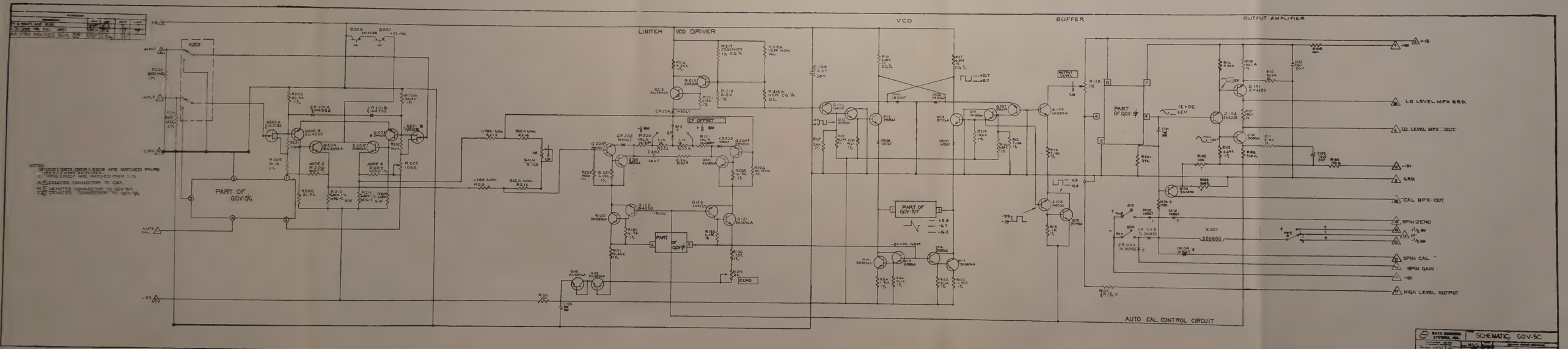


NOTES:

1) THE GOV-5/F PLUGS INTO THE DCS MODEL GOV-5 ASSY. ALL POWER & SIGNAL CONNECTIONS ARE MADE FROM GOV-5 TO GOV-5/F VIA ELCO CONNECTIONS AS TABULATED.
2) PIN CONNECTIONS ARE NUMBERED FROM LEFT TO RIGHT.
3) SEE SCHEMATIC CW-015769 FOR REF. PIN NUMBERS.

DATA CONTROL SYSTEMS, INC.	TITLE: OUTLINE DWG., TUNING UNIT		
TOLERANCES: UNLESS OTHERWISE SPECIFIED DECIMAL - 3 PLACE ± .010 DECIMAL - 2 PLACE ± .020 FRAC. ± 1/64 ANG. ± 0°30' FLATNESS WITHIN ~/IN. FRACTIONAL HOLES -0. ± 1/32. NOTE: BREAK ALL SHARP CORNERS .005"-.015" SURFACE ROUGHNESS NOT TO EXCEED ~	DWN. MGS	DATE 3/1/67	DO NOT SCALE DRAWING
	CHKD [illegible]	6/12/67	MAT'L ~
	ENG. [illegible]	3/1/67	FINISH ~
	AP. [illegible]	6/9/67	CO-015874 REV. A
	SCALE FULL		SHEET

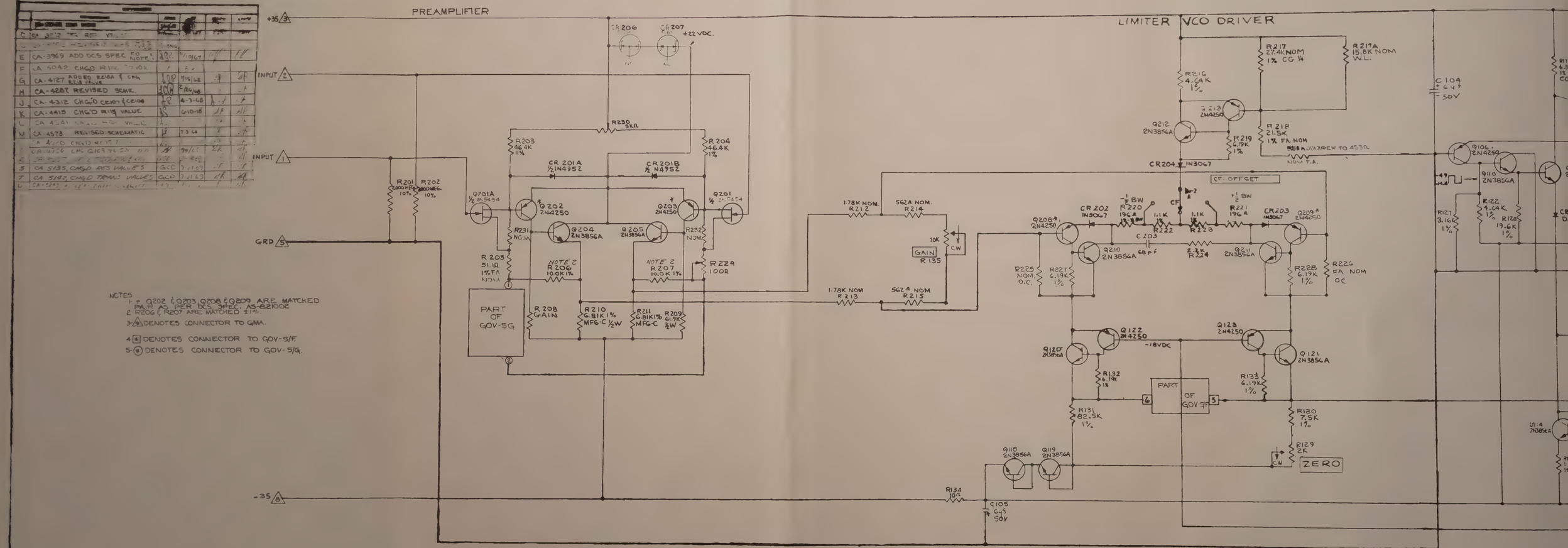
NEXT ASSEMBLY	QTY. ASSY.
~	~



DATA CONTROL SYSTEMS, INC.

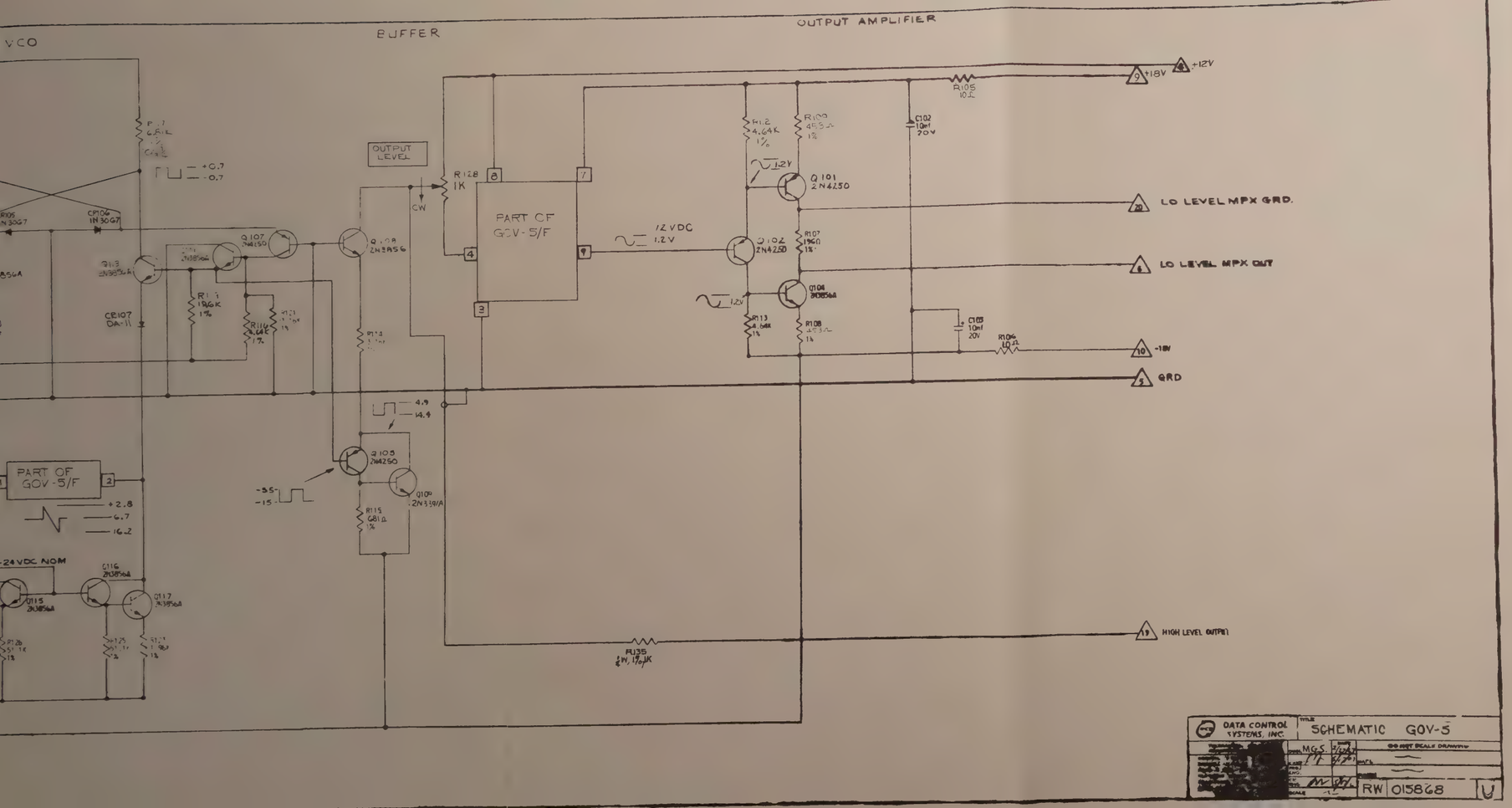
SCHEMATIC, GOV-5C

RW-016062



NOTES
1 * Q202 & Q203, Q208 & Q209 ARE MATCHED PAIRS AS PER DCS 30FEC-A5-B21002
2 R206 & R207 ARE MATCHED 1%.
3-(A) DENOTES CONNECTOR TO GMA.
4-(F) DENOTES CONNECTOR TO GOV-5/F.
5-(G) DENOTES CONNECTOR TO GOV-5/G.

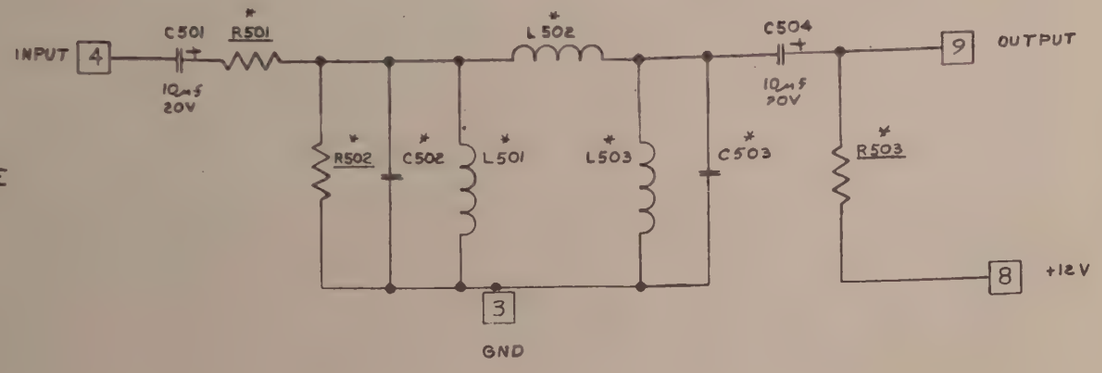
C	CA 3812 TO REV VI				
D					
E	CA-3969 ADD DCS SPEC TO NOTE 1	JJD	11/19/67		
F	CA 4042 CHG'D R106 TO 10K		2		
G	CA-4127 ADDED R218A & CHG R218 VALUE	JJD	9/15/68		
H	CA-4287 REVISED SCHE.	JCH	2/24/68		
J	CA-4312 CHG'D CE101 & CR108	JJD	4-3-68		
K	CA-4413 CHG'D R119 VALUE	JJD	6-10-68		
L	CA 4541 CHG'D R129 VALUE	JJD			
M	CA 4578 REVISED SCHEMATIC	JJD	7-3-68		
N	CA 4760 CHG'D R209 TO 61.9K	JJD	9/16/68		
P	CA-4756 CHG CR9 TO 1N [illegible]	JJD	9/16/68		
R	[illegible]	[illegible]	[illegible]		
S	CA 5135, CHG'D RES VALUES	GCD	1-16-69		
T	CA 5192 CHG'D TRANS VALUES	GCD	7-21-69		
U	CA-5240 [illegible]	[illegible]	[illegible]		


VCO
BUFFER
OUTPUT AMPLIFIER
OUTPUT LEVEL
CW
PART OF GOV-5/F
PART OF GOV-5/F
+0.7
-0.7
+2.8
6.7
16.2
-24 VDC NOM
-35
-15
4.9
14.9
12 VDC
1.2V
+18V
+12V
LO LEVEL MPX GRD.
LO LEVEL MPX OUT
-18V
GRD
HIGH LEVEL OUTPUT
R105 10Ω
C102 10mf 20V
C103 10mf 20V
R106 10Ω
R112 4.64K 1%
R100 453Ω 1%
R107 196Ω 1%
R113 4.64K 1%
R108 453Ω 1%
R128 1K
Q101 2N4250
Q102 2N4250
Q104 2N3568
Q108 2N4250
Q109 2N3856
Q105 2N4250
Q107 2N4250
Q113 2N3568
Q115 2N3568
Q116 2N3568
Q117 2N3568
CR106 1N3067
CR107 DA-11
R115 681Ω 1%
FU135 2W, 1/10 JK
DATA CONTROL SYSTEMS, INC.
SCHEMATIC GOV-5
RW 015868
U

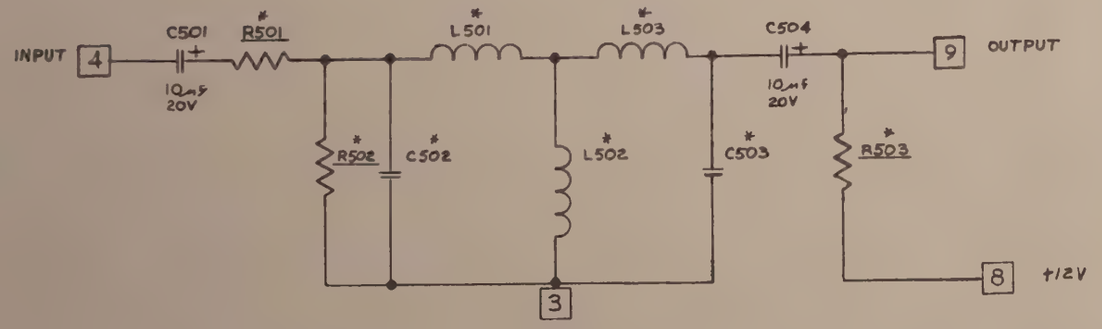
REV	DESCRIPTION	DATE	DWN.	CHK.	APP.

ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY. ASSY

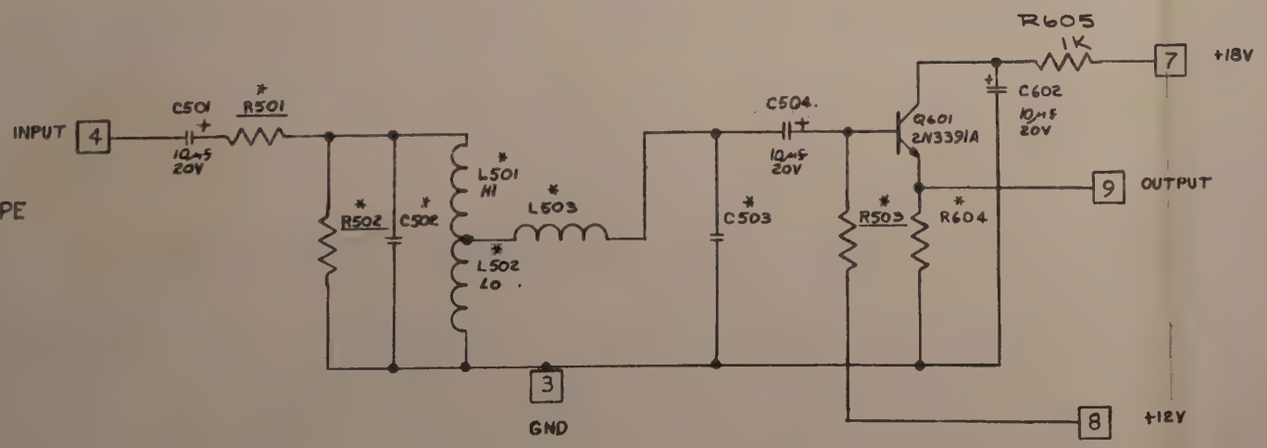
"π" TYPE

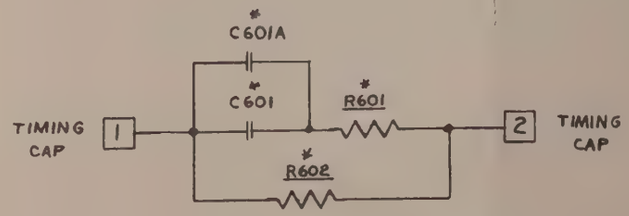


"T" TYPE



"TAP" TYPE



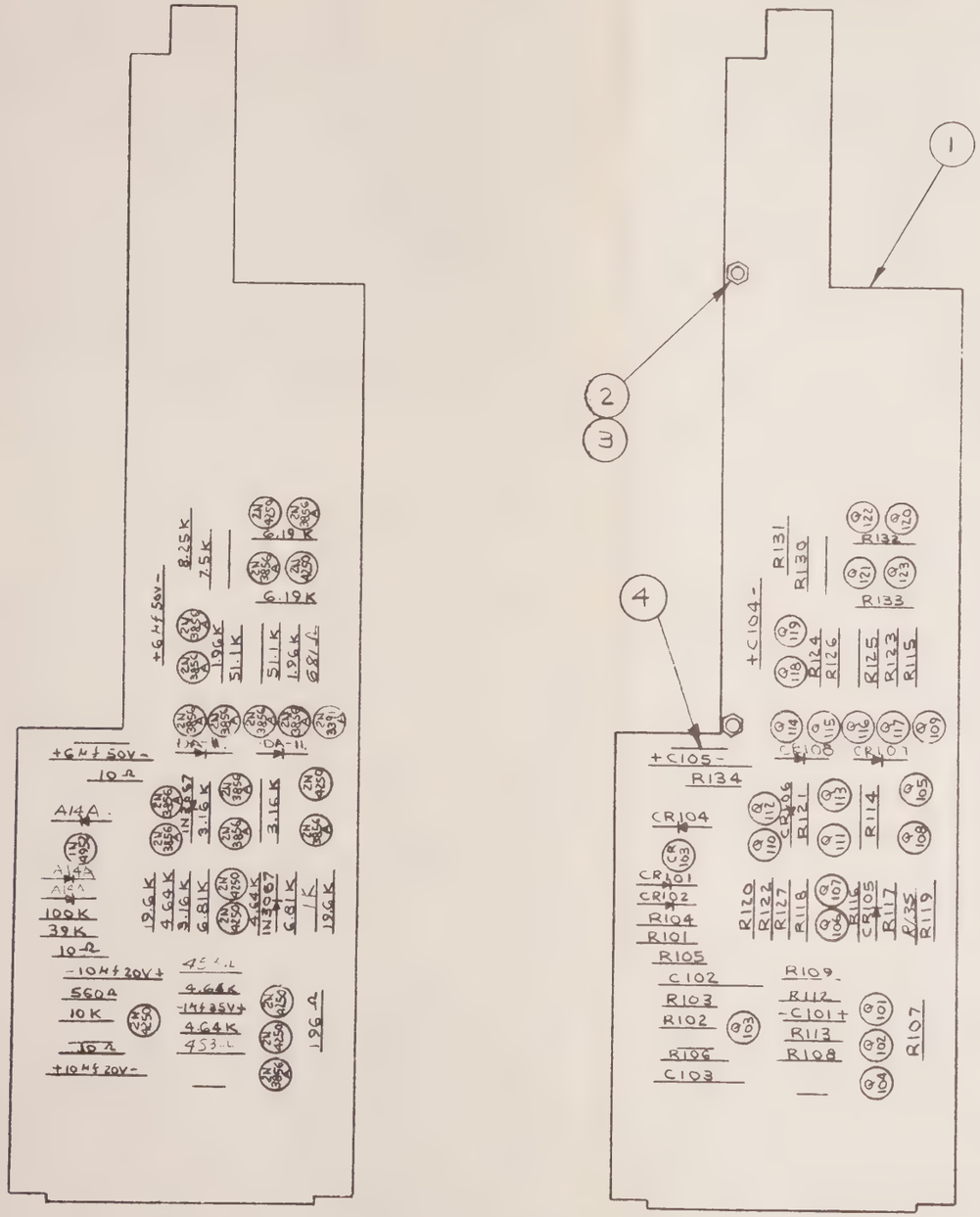


NOTES:
1) ☐ ELCO CONNECTIONS
2) UNDERLINED RES. ARE ELECTRA, MF5C-D, 1%, ALL OTHERS ARE AB, CB, 1/4W, 10%
3) * FREQUENCY SENSITIVE

GOV-5/F			
PRODUCT	NEXT ASSEMBLY	QTY. ASSY.	

DATA CONTROL SYSTEMS, INC.		TITLE: SCHEMATIC, FILTERS	
TOLERANCES: UNLESS OTHERWISE SPECIFIED	DWN. JEH	DATE 1-19-67	DO NOT SCALE DRAWING
DECIMAL - 3 PLACE ± .005	CHKD.	3/12/67	MAT'L
DECIMAL - 2 PLACE ± .010	ENG.	3/17/67	FINISH
FRAC. ± 1/64 ANG. ± 0°30'	APP.	3/17/67	CW-016769 REV. A
FLATNESS WITHIN /IN.	SCALE		SHEET
FRACTIONAL HOLES ⌀ ± 1/64			
NOTE- BREAK ALL SHARP CORNERS .005"-.015"			
SURFACE ROUGHNESS NOT TO EXCEED			

REV.	DESCRIPTION	QTY



ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
1		DF - 015777	BOARD FAB MASTER	1
	R 101		RES AB CB 1/4W 10% 39K	1
	R 102		10K	1
	R 103		560Ω	1
	R 104		100K	1
	R 105		10Ω	1
	R 106		100	1
	R 107		RES ELECTRA MF5C-D 1/4W 1% 196Ω	1
	R 108		453Ω	1
	R 109		453Ω	1
	R 112		4.64K	1
	R 113		4.64K	1
	R 114		RES W.L. RN60C 1/4W 1% 3.16K	1
	R 115		ELECTRA, MF5C-D 1/4W 1% 51.1K	1
	R 116		W.L. RN60C 1/4W 1% 4.64K	1
	R 117	*	RES T.I., C.G. 1/4W 1% 6.81K	1
	R 118	*	RES T.I., C.G. 1/4W 1% 6.81K	1
	R 119		RES W.L. RN60C 1/4W 1% 19.6K	1
	R 120		19.6K	1
	R 121		3.16K	1
	R 122		4.64K	1
	R 123		1.96K	1
	R 124		1.96K	1
	R 125		51.1K	1
	R 126		51.1K	1
	R 127		3.16K	1
	R 128	POT FRONT PANEL		1
	R 129	POT FRONT PANEL		1
	R 130		RES W.L. RN60E 1/4W 1% 7.5K	1
	R 131		W.L. RN60E 8.25K	1
	R 132		W.L. RN60C 6.19K	1
	R 133		6.19K	1
	R 134		RES AB CB 1/4W 10% 10Ω	1
	C 101		CAP SPRAGUE 150D 20% 35V 1uf	1
	C 102		CAP SPRAGUE 150D 20% 20V 10uf	1

ITEM	SYMBOL	PART NO.	DESCRIPTION		QTY REQ'D
	C 103		CAP SPRAGUE 150D 20% 20V	10uf	1
	C 104		CAP GENTRONICS 101D BA 20% 50V	6uf	1
	C 105		CAP GENTRONICS 101D BA 20% 50V	6uf	1
	CR 101		DIODE G.E.	A14A	1
	CR 102		DIODE G.E.	A14A	1
	CR 103		DIODE G.E.	IN4952	1
	CR 104		DIODE G.E.	A14A	1
	CR 105		DIODE CONT. DEV.	IN3067	1
	CR 106		DIODE CONT DEV.	IN3067	1
	CR 107		DIODE SOLITRON.	DA-11	1
	CR 108		DIODE		1
	Q 101		TRANS. FAIRCHILD	2N4250	1
	Q 102			2N4250	1
	Q 103			2N4250	1
	Q 104		TRANS. G.E.	2N3856A	1
	Q 105		TRANS. FAIRCHILD	2N4250	1
	Q 106		TRANS FAIRCHILD	2N4250	1
	Q 107		TRANS FAIRCHILD	2N4250	1
	Q 108		TRANS G.E.	2N3856A	1
	Q 109			2N3391A	1
	Q 110			2N3856A	1
	Q 111			2N3856A	1
	Q 112			2N3856A	1
	Q 113			2N3856A	1
	Q 114			2N3856A	1
	Q 115			2N3856A	1
	Q 116			2N3856A	1
	Q 117			2N3856A	1
	Q 118			2N3856A	1
	Q 119			2N3856A	1
	Q 120			2N3856A	1
	Q 121			2N3856A	1
	Q 122		TRANS FAIRCHILD	2N4250	1
	Q 123		TRANS FAIRCHILD	2N4250	1

ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
2		BD-013968	GUIDE PIN	2
3		AS-826020-*-40	NUT, SELF LOCKING	2
4			JUMPER WIRES AWG 20	7
	R135		RES. ELECTRA, MF5C-D, ¼W, 1%, 1K	1

REV.	ZONE	DESCRIPTION	DATE	DWN.	CHK.	APP.
B		CR105+106 WERE FH1100	3/6/67	MGS		
C		R+E REVISED	3/13/67	MGS		
D		Q105 WAS 2N3856A	3/29/67	MGS		
E		CA-3843 ADD R135	11/1/67			
F		CA-4042 CHG R104 TO 10SL	11/27/67			
G		CA-4312 CHG CR107 (CR108 A-348				
H		CA-4415 CHG REG. VALUE				
J		CA-4546 CHG'D REF TYPE				
K		CA-4756 CHG Q-109 TO 2N3391A	10/13/4	MR		
L		CA-4856 CHG'D DIODES	4/9/68	JEH		
M		CA 5007, DELETED R110 & R111	3-12-68	GCD		
N		CA-4856-1 CHG'D DIODES CR101, CR102 & CR104	3-19-68	GCD		

NOTE:

* R117 + R118 MUST BE T. I., C.G. 1/4W 1% RESISTORS FOR CIRCUIT STABILITY.

DATA CONTROL SYSTEMS, INC.

TITLE: MASTER BOARD ASS'Y. GOV-5C

TOLERANCES: UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN /IN.
FRACTIONAL HOLES -0, + 1/64
NOTE- BREAK ALL SHARP CORNERS .005"-.015"
SURFACE ROUGHNESS NOT TO EXCEED ✓

		DATE
DWN.	M.G.S.	2/4/67
CHKD.		3/15/67
ENG.		
APP.		
SCALE	~	

DO NOT SCALE DRAWING

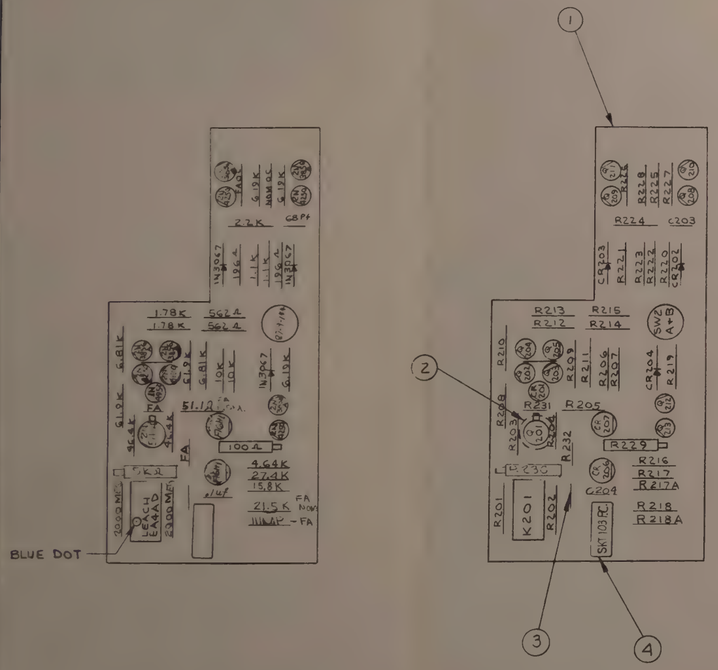
MAT'L ~

FINISH ~

GA 015789

REV. J

SHEET



ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
1		CF - 015604	BOARD FAB PRE AMP	1
	R 201		RES I.R.C., G.B.T. 1/2 2000MEG	1
	R 202		RES. I.R.C., G.B.T. 1/2 2000MEG	1
	R 203		RES. W.L. RN60C 1/4W 1% 46.4K	1
	R 204		46.4K	1
	R 205		FA NOM 51.1Ω	1
	R 206		10K	1
	R 207		10K	1
	R 208		61.9K	1
	R 209		61.9K	1
	R 210		RES MFG-C 1/2W. 1% 6.81K	1
	R 211		RES. MFG-C 1/2 W. 1% 6.81K	1
	R 212		RES. W.L. RN60C 1/4W 1% 1.78K	1
	R 213		1.78K	1
	R 214		5620	1
	R 215		5620	1
	R 216		4.64K	1
	R 217		RES. T.I.C.G. 1/4W 1% NOM 27.4K	1
	R 218		RES W.L. RN60C 1/4W 1% FA NOM. 21.5K	1
	R 219		RN60C 6.19K	1
	R 220		1960	1
	R 221		1960	1
	R 222		1.1K	1
	R 223		1.1K	1
	R 224		RES AB, CB 1/4W 10% 2.2K	1
	R 225		NOM. O.C.	1
	R 226		FA O.C.	1
	R 227		RES. W.L. RN60C 1/4W. 1% 6.19K	1
	R 228		RES. W.L. RN60C 1/4W. 1% 6.19K	1
	R 229		POT BOURNS NO. 3007P-1-101 1000	1
	R230		RES, POT BOURNS #3007P-1-502 5025Ω	1
	R 231		RES AB, CB 1/4W 10% F.A.	1
	R 232		RES., AB, CB 1/4W 10% F.A.	1
	C 203		CAP. DURMICA DM10 100V 10% 68pf	1
	C 204		CAP. RMC 100V. .1uf	1
	CR 201		DIODE G.E. IN4952	1

ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
	CR 202		DIODE CONT. DEV. IN3067	1
	CR 203		DIODE CONT. DEV. IN3067	1
	CR 204		DIODE CONT. DEV. IN3067	1
	Q 201		TRANS UNION CARBIDE 2N5454	1
	Q 202	*	TRANS FAIRCHILD 2N4250	1
	Q 203	*	TRANS FAIRCHILD 2N4250	1
	Q 204		TRANS G.E. 2N3856A	1
	Q 205		TRANS G.E. 2N3856A	1
	CR206		DIODE G.E. F16H1	1
	CR207		F16H1	1
	Q 208	**	TRANS FAIRCHILD 2N4250	1
	Q 209	**	2N4250	1
	Q 210		TRANS G.E. 2N3856A	1
	Q 211		TRANS G.E. 2N3856A	1
	K 201		RELAY LEACH E-A4AD OR PHILLIPS EQUIVALENT	
2			HEATSINK BIRCHER NO. 3AL-669-3B	1
	SW2 A&B		SPECTROL 87-9-144	1
3			JUMPER WIRES AWG 20	4
	Q212		TRANS. G.E. 2N3856A	1
	Q213		TRANS FAIRCHILD 2N4250	1
	R217A		RES, FILM, RN60C, 1/4W, 1%, NOM FA 15.8K	1
	R218A		RES MFG-D FA JUMPER 10.45Ω	1
4			SEALECTRO TEST JACK SKT108RC	1

SYM	DESCRIPTION	DATE	BY	CHK'D	APP'D
	REVISIONS				
B	ADDED Q212 + Q213	3/9/67	MGS		
C	R+E REVISED	3/11/67	MGS		
D	R229 + R230 WERE AMPHENOL	3/14/67	MGS		
E	CA-3792 CHG'D POSITION OF JUMPER	3/16/67	[illegible]		
F	CA 3866 CHG RES VALUE	4/14/67	[illegible]		
G	CA-4127 CHG RES VALUE	7/13/68	[illegible]		
H	CA-4287 CHG RES VALUE & ADDED POT	2/26/68	[illegible]		
J	CA-4546 CHG. RES. TYPE	6-10-68	[illegible]		
K	CA-4591 CHG RES TYPE	7-1-68	[illegible]		
L	CA-4590 ADDED C204	7-24-68	MR		
M	CA 4620 CHG'D R205 TO F.A.	8-20-68	[illegible]		
N	CA-5100, CHGD SW2, A&B	6-9-69	GCD		
P	CA-5135, CHGD RES VALUES	7-21-69	GCD		
R	CA-5142, CHGD TRANS VALUES	7-21-69	GCD		
S	CA-5249, CR206+CR207 WAS Q206+Q207	11/21/69	LG.		

NOTES:

1- * INDICATES MATCHED PAIR Q202 + Q203 TRANS. WITHIN ± 5% BETA.

2- ** INDICATES MATCHED PAIR Q208 + Q209 TRANS. WITHIN ± 5% BETA.

3- SCREW LENGTHS TO BE DETERMINED IN ACCORDANCE WITH D.C.S. WORKMANSHIP MANUAL N& AS 832011.

DATA CONTROL SYSTEMS, INC.

TITLE: PRE AMP BOARD ASSY GOV-S/C

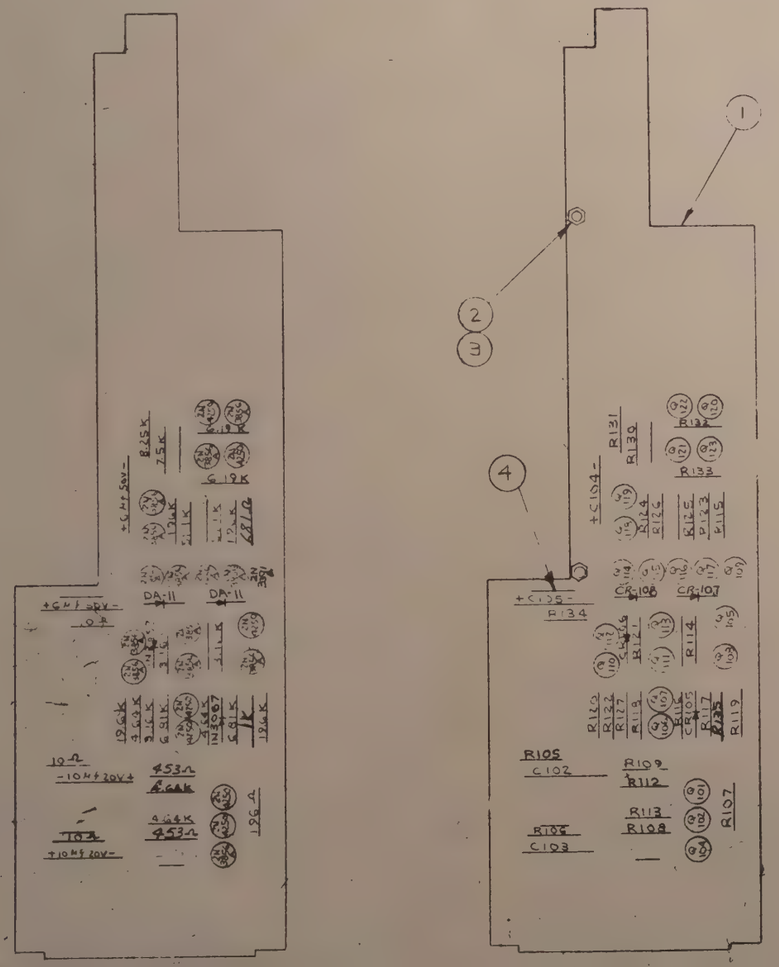
TOLERANCES: UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN .001
FRACTIONAL HOLES +0, -1/64
NOTE: BREAK ALL SHARP CORNERS .005"-.015"

DO NOT SCALE DRAWING

		DATE
DWN.	NGS	2/8/67
CHK'D.	RAM	3/11/67
PROJ. ENG.		
CH. ENG.		
SCALE		

MAT'L
FINISH

IA 015790 S



ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
1		DF - 015777	BOARD FAB "MASTER"	1
	R 105		RES. ABCB 1/4W 10% 10Ω	1
	R 106		100	1
	R 107		RES. ELECTRA "MF5C-D 1/4W 1% 196Ω	1
	R 108		453Ω	1
	R 109		453	1
	R 112		4.64K	1
	R 113		4.64K	1
	R 114		RES W.L. RN6 1/4W 1% 3.16K	1
	R 115		ELECTRA MF5C-D 681Ω	1
	R 116		W.L. RN60C ¼W 1% 4.64K	1
	R 117	*	RES T.F.,C.G. 1/4W 1% 6.81K	1
	R 118	*	RES T.F.,C.G. 1/4W 1% 6.81K	1
	R 119		RES W.L. RN60C 1/4W 1% 19.6K	1
	R 120		19.6K	1
	R 121		3.16K	1
	R 122		4.64K	1
	R 123		1.96K	1
	R 124		1.96K	1
	R 125		51.1K	1
	R 126		51.1K	1
	R 127		3.6K	1
	R 128	POT FRONT PANEL		1
	R 129	POT FRONT PANEL		1
	R 130		RES W.L. RN60E 1/4W 1% 7.5K	1
	R 131		RN60E 8.25K	1
	R 132		RN60C 6.19K	1
	R 133		6.19K	1
	R 134		RES AB CB 1/4W 10% 10Ω	1
	R135		RES. ELECTRA, MF5C-D ¼W, 1% 1K	1
	C 102		CAP SPRAGUE 150D 20% 20V 10uf	1

ITEM	SYMBOL	PART NO.	DESCRIPTION
	C 103		CAP SPRAGUE 150D 20% 20V
	C 104		CAP GENTRONICS 101E BA 20% 50V
	C 105		CAP GENTRONICS 101E BA 20% 50V
	CR 105		DIODE CONT DEV. 1N3
	CR 106		DIODE CONT DEV. 1N3
	CR 107		DIODE SOLITRON DA-
	CR 108		DIODE
	Q 101		TRANS. FA
	Q 102		TRANS. FAIRCHILD 2N4
	Q 104		TRANS. G.E. 2N3
	Q 105		TRANS. FAIRCHILD 2N4
	Q 106		TRANS FAIRCHILD 2N4
	Q 107		TRANS FAIRCHILD 2N4
	Q 108		TRANS G.E. 2N3
	Q 109		2N3
	Q 110		2N3
	Q 111		2N3
	Q 112		2N3
	Q 113		2N3
	Q 114		2N3
	Q 115		2N3
	Q 116		2N3
	Q 117		2N3
	Q 118		2N3
	Q 119		2N3
	Q 120		2N3
	Q 121		2N3
	Q 122		TRANS FAIRCHILD 2N4
	Q 123		TRANS FAIRCHILD 2N4

ITEM	SYMBOL	PART NO.	DESCRIPTION

REV	ZONE	DESCRIPTION	DATE	DWN	CHK.	APP
B	~	CA-3843 ADD R135	7/14/67	MGS	CC	CC
C	~	CA-4042 CHG'D RES R106 TO 102	8/29/67	MGS	[illegible]	[illegible]
D	~	CA-4312 CHG CR107 & CR108	9-26-67	AP	GR	GR
E	~	CA-4415 CHG RES VALUE	6-10-68	AP	GR	GR
F	~	CA-4546 CHG. RES TYPE	6-10-68	AP	GR	GR
G	~	CA-4756 CHG Q109 TO 2N3391A	10/14/68	GR	GR	GR
H	~	CA-5007, DELETED R140 R111	3-12-69	SCD	GR	GR

ITEM	SYMBOL	PART NO.	DESCRIPTION	QTY REQ'D
2		BD-013968	GUIDE PIN	2
3		AS-820020-*-40	NUT, SELF LOCKING	2
4			JUMPER N:RES AWG 20	7

NOTE

* R117 + R118 MUST BE T. I.; C.G. 1/4 W 1% RESISTORS FOR CIRCUIT STABILITY.

DATA CONTROL SYSTEMS, INC.

TITLE: MASTER BOARD ASS'Y. GOV-5

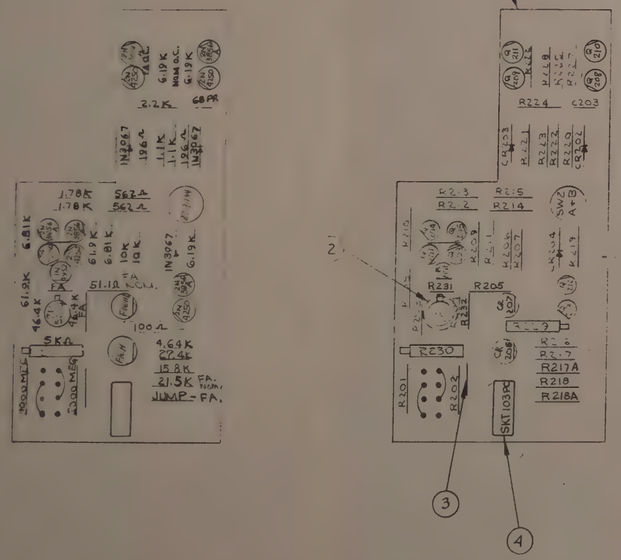
TOLERANCES: UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN ___/IN.
FRACTIONAL HOLES ø .+ 1/64
NOTE- BREAK ALL SHARP CORNERS .005" - .015"
SURFACE ROUGHNESS NOT TO EXCEED ✓

DWN. M.G.S. DATE 2/4/67
CHKD.
ENG.
APP.
SCALE

DO NOT SCALE DRAWING
MAT'L
FINISH

GA-016017 REV. H

SHEET



ITEM	SYMBOL	PART NO	DESCRIPTION	QTY. REQ'D
1		CF - 015604	BOARD FAB PRE AMP	1
	R 201		RES I.R.C., G.B.T. 1/2 2000MEG	1
	R 202		RES. I.R.C., G.B.T. 1/2 2000MEG	1
	R 203		RES. W.L. RN60C 1/4W 1% 46.4K	1
	R 204		46.4K	1
	R 205		FA. NOM. 51.1Ω	1
	R 206		10K	1
	R 207		10K	1
	R 208		61.9K	1
	R 209		61.9K	1
	R 210		RES MFG-C 1/2W. 1% 6.81K	1
	R 211		RES. MFG-C 1/2 W. 1% 6.81K	1
	R 212		RES. W.L. RN60C 1/4W 1% 1.78K	1
	R 213		1.78K	1
	R 214		562Ω	1
	R 215		562Ω	1
	R 216		4.64K	1
	R 217		RES. T.I.C.G. 1/4W 1% FA. NOM. 27.4K	1
	R 218		RES W.L. RN60C 1/4W 1% FA. NOM. 21.5K	1
	R 219		RN60C 6.19K	1
	R 220		196Ω	1
	R 221		196Ω	1
	R 222		1.1K	1
	R 223		1.1K	1
	R 224		RES AB,CB 1/4W 10% 2.2K	1
	R 225		NOM. Ω	1
	R 226		FA. Ω	1
	R 227		RES W.L. RN60C 1/4W. 1% 6.19K	1
	R 228		RES. W.L. RN60C 1/4W. 1% 6.19K	1
	R 229		POT BOURNS NO. 3007P-1-101 100Ω	1
	R230		RES, POT. BOURNS 3007P-1-502 5K	1
	R231		RES. AB,CB, 1/4W 10% FA.	1
	R232		RES AB,CB 1/4W. 10% FA.	1
	C 203		CAP. DURMICA DM 100V 10% 68pf	1
	CR 201		DIODE G.E. 1N4952	1

ITEM	SYMBOL	PART NO	DESCRIPTION	QTY. REQ'D
	CR 202		DIODE CONT. DEV. 1N3067	1
	CR 203		DIODE CONT. DEV. 1N3067	1
	CR 204		DIODE CONT. DEV. 1N3067	1
	Q 201		TRANS UNION GATE 2N5454	1
	Q 202	**	TRANS FA MATCHED 2N3250	1
	Q 203	**	TRANS FA MATCHED 2N4250	1
	Q 204		TRANS G.E. 2N3856A	1
	Q 205		TRANS G.E. 2N3856A	1
	CR 206		DIODE, G.E. FIGHI	1
	CR 207		DIODE, G.E. FIGHI	1
	Q 208	**	TRANS. FAIRCHILD 2N4250	1
	Q 209	**	TRANS, FAIRCHILD 2N4250	1
	Q 210		TRANS G.E. 2N3856A	1
	Q 211		TRANS G.E. 2N3856A	1
2			HEATSINK BIRCHER NO. 32-659-32	2
	S-2 ABC		SPECTROL, 87-9-144	1
3			JUMPER W. RES AWG 20	4
	Q 212		TRANS. G.E 2N3856A	1
	Q 213		TRANS FAIRCHILD 2N4250	1
	R 217A		RES. W.L. RN60C NOM 15.8K	1
	R 218A		RES. MFG-D ¼W JUMPER TO 453Ω	1
4			SEALECTRO TEST JACK SKT 103 PC	1

SYM	DESCRIPTION	DATE	BY	CHK'D	APP'D
B	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
C	CA 38[illegible] CHG. RES. VALUE	[illegible]	[illegible]	[illegible]	[illegible]
D	CA-3912 CHG'D RES. VALUE	9/13/67	[illegible]	[illegible]	[illegible]
E	CA-3969 ADD DCS SPEC. CALLOUT TO R202, R203, 208 + 209 AS 832002	11/3/67	[illegible]	[illegible]	[illegible]
F	CA-4127 CHG RES VALUES	1/15/68	[illegible]	[illegible]	[illegible]
G	CA-4287 ADD POT REMOVE JUMP.	4/26/68	[illegible]	[illegible]	[illegible]
H	CA-4546 CHG. REC. TYPE	[illegible]	[illegible]	[illegible]	[illegible]
J	CA-4541 CHG REC. TYPE	7-1-68	[illegible]	[illegible]	[illegible]
K	CA 4620 CHG'D R205 TO F.A.	8-20-68	[illegible]	[illegible]	[illegible]
L	CA-5100, CHG'D SW-2, A&B	6-9-69	GCD	[illegible]	[illegible]
M	CA-5135, CHG'D RES. VALUE	7-21-69	GCD	[illegible]	[illegible]
N	CA-5142, CHG'D TRANS. VALUE	7-21-69	GCD	[illegible]	[illegible]
P	CA-5249, CR206 & CR207 WAS Q206 & Q207	11/21/69	L.G.	[illegible]	[illegible]

NOTES:

1) ** Q202, Q203, Q208 & Q209 ARE MATCHED PAIR PER D.C.S SPEC. AS-821002.

2) SCREW LENGTHS TO BE DETERMINED IN ACCORDANCE WITH D.C.S. WORKMANSHIP MANUAL N° AS 832011

DATA CONTROL SYSTEMS, INC.

TITLE: PRE AMP BOARD ASSY. GOV'T

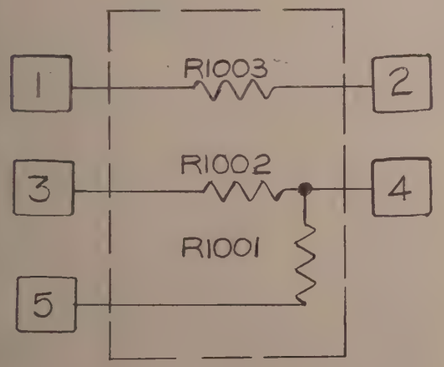
TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN /IN.
FRACTIONAL HOLES -0, + 1/64
NOTE BREAK ALL SHARP CORNERS .005"-.015"

DWN MGS DATE 2/8/67
CHK'D
PRO'D
ENG'D
M ENG
SCALE

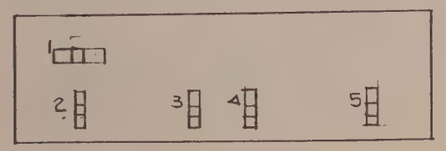
DO NOT SCALE DRAWING
MAT'L
FINISH

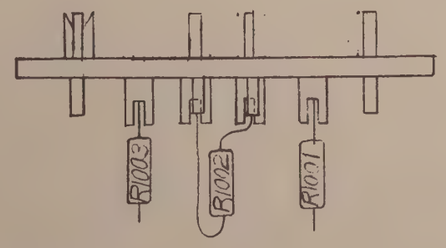
DWG NO. TA-016018 REV P

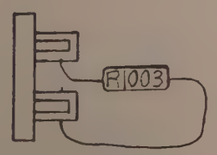
REV	DESCRIPTION	DATE	DWN.	CHK.	APP.
B	CA-3782 REVISED DWG.	6/27/67			
C	CA-4041 REVISED DWG	11/29/67			
D	CA-4331 CHGD POS OF PINS	4-2-68			
E	CA-4663 ADD 6.32 VOLTS	8-26-68			

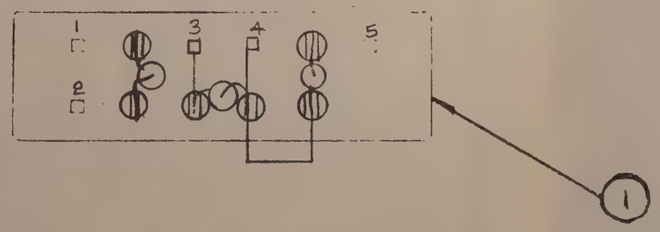


CONNECTOR SIDE









COMPONENT SIDE

REV.
B

ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY./ASSY.
1		CF-015746	BOARD FAB; PLUG IN	1

SEE NOTE 3

E IN FB'V	R1001	R1002	R1003
.5 VOLTS	6.66	60K	1.05K
.75 VOLTS	10.5	60K	1.62K
1 VOLTS	15	60K	2.21K
2 VOLTS	40.0K	60K	4.99K
2.5 VOLTS	60	60K	6.65K
3 VOLTS	80K	40K	8.66
4 VOLTS	60K	15	13.3K
5 VOLTS	OPEN	SHORT	20K
6 VOLTS			30.1K
7.5 VOLTS			60.4K
8 VOLTS			80.6K
10 VOLTS			OPEN
6.32 VOLTS	OPEN	SHORT	34.0K
E VOLTS			20E/10-E

NOTE;
1) R1001 & R1002 ARE ± 0.1% WIRE WOUND 1/10 WRCL TYPE 7007 OR EQUAL.
2) R1003 IS ± 1% METAL FILM 1/8 W WL600 OR EQUAL.
3) NON-STANDARD INPUT REQUIRING SPECIAL CALIBRATE SIGNAL. VALUES WILL BE DETERMIND BY CALIBRATE INPUT LEVEL.

REF.	DESCRIPTION	QTY
	GOV 5/6	

QTY.

DATA CONTROL SYSTEMS, INC.

TITLE: ASSY PLUG IN BOARD GOV-5/6

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL 3 PLACE ± 005
DECIMAL 2 PLACE ± 010
FRAC ± 1/64 ANG ± 0°30'
FLATNESS WITHIN /IN
FRACTIONAL HOLES .0 + 1/64
NOTE- BREAK ALL SHARP CORNERS .005"-.015"
SURFACE ROUGHNESS NOT

		DATE
DWN.	GCG	4/10/67
CHKD		5
ENG		17
APP.		67
SCALE	2-1	

DO NOT SCALE DRAWING

MAT'L

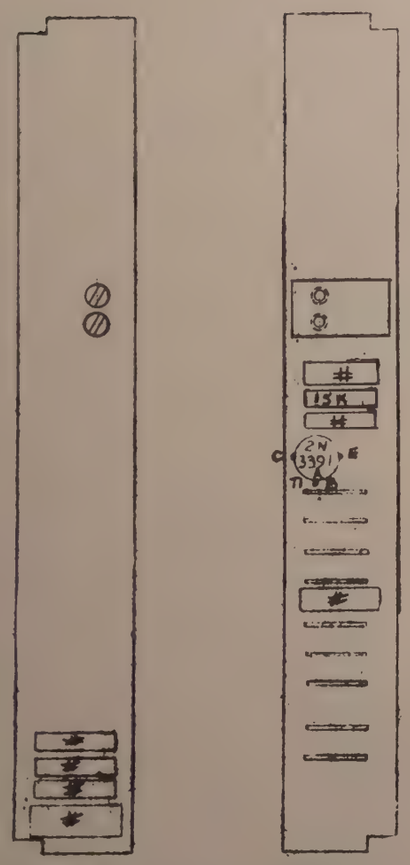
FINISH

BA-016022 REV. E

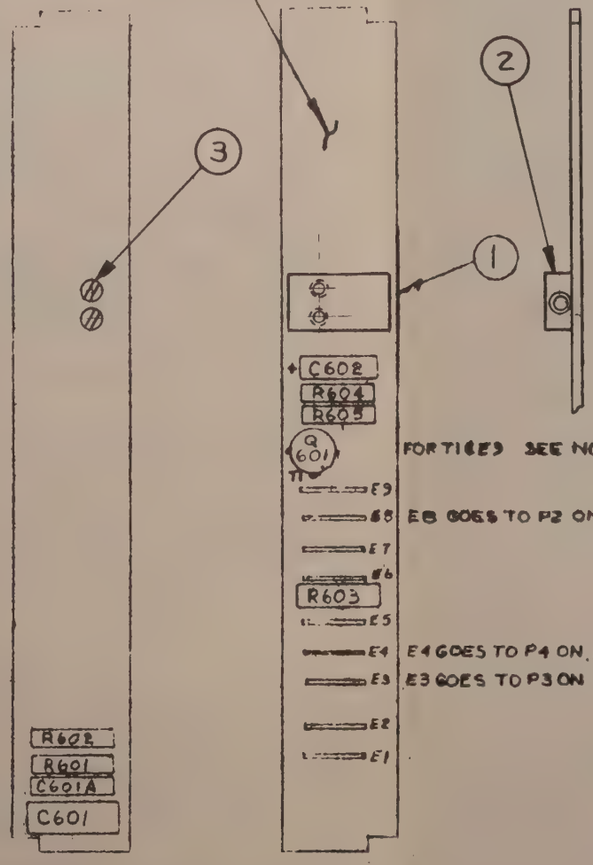
SHEET

SYM.	DESCRIPTION	DATE	DWN.	CHK.	APP.
B					

STAMP D.C.S. PART NO. IN 1/8 HIGH CONTRASTING CHARACTERS APPROX. AS SHOWN



COMPONENT VIEW WITH VALUES



FOR TIES SEE NOTE 4

E8 GOES TO P2 ON BA-016025

E4 GOES TO P4 ON BA-016025

E3 GOES TO P3 ON BA-016025

COMPONENT VIEW WITH SYMBOLS

ITEM	SYMBOL	DWG. NO	DESCRIPTION	QTY/ASSY.
1		CF-015794	BOARD FAB	1
	R601		SHORT	1
	R602	#	RES, ELECTRA MF5CD 1/4W 1% 8.25K	1
	R603	#	RES, ELECTRA MF5CD 1/4W 1%	1
	R604		RES, AB, CB, 1/4W 10% 15K	1
	R605		SHORT	1
	C601	#	CAP, DURAMICA DM10	1
	C601A	#	CAP DURAMICA DM10	1
	C602		OPEN	1
	Q601		TRANS, GE 2N3391A	1
2		BD-015793	BLOCK GUIDE	1
3		AS-826028-*-26	SCREW, 2-56 100° F.H.M.S. *	2

NOTES:

1) REF. SCHEMATIC GOV-5/F CW-015769
   REF SCHEMATIC GOV-5 GW-015868
2) CAP. VALUES PER DCS 814007, DURAMICA, 1% UP TO 5000 μμf.
   CAP. 5000 μμf & UP ARE AMERICAN RAD. TYPE PCRPC, POLYCARBONATE, RED PLASTIC CASE, 1%, 50V, CASE SIZES AS BELOW:
   5000 μμf TO .40 μf - CASE "B"
   .40 μf & UP - CASE "A"
3) # = FREQUENCY DETERMINED COMP
4) E9 GOES TO P1, ON BA-016025, WHEN A TRANSISTOR IS NOT USED.
   T1 GOES TO P1, ON BA-016025, WHEN A TRANSISTOR IS USED.
5) A TRANSISTOR IS USED WHEN THE FILTER IMPEDANCE IS 10K OHMS, OR HIGHER.
6) * SCREW LENGTHS TO BE DETERMINED IN ACCORDANCE WITH DCS WORKMANSHIP MANUAL # AS 832011.
7) C601 + C601A ARE DM10 UNLESS OTHERWISE SPECIFIED.

SYM.	DESCRIPTION	DATE

GOV 5/F		1
PRESENT	NEXT ASSEMBLY	QTY/ASSY

DATA CONTROL SYSTEMS, INC.

TITLE BOARD ASSY, TIMING

TOLERANCES: UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN ~ /IN.
FRACTIONAL HOLES Ø. + 1/64
NOTE- BREAK ALL SHARP CORNERS .005"-.015"
SURFACE ROUGHNESS NOT TO EXCEED

		DATE
DWN	MGS	2/27/67
CHK	GB	3/17/67
ENG	RAT	3/17/67
APP	RAT	3/17/67
QC	FULL	

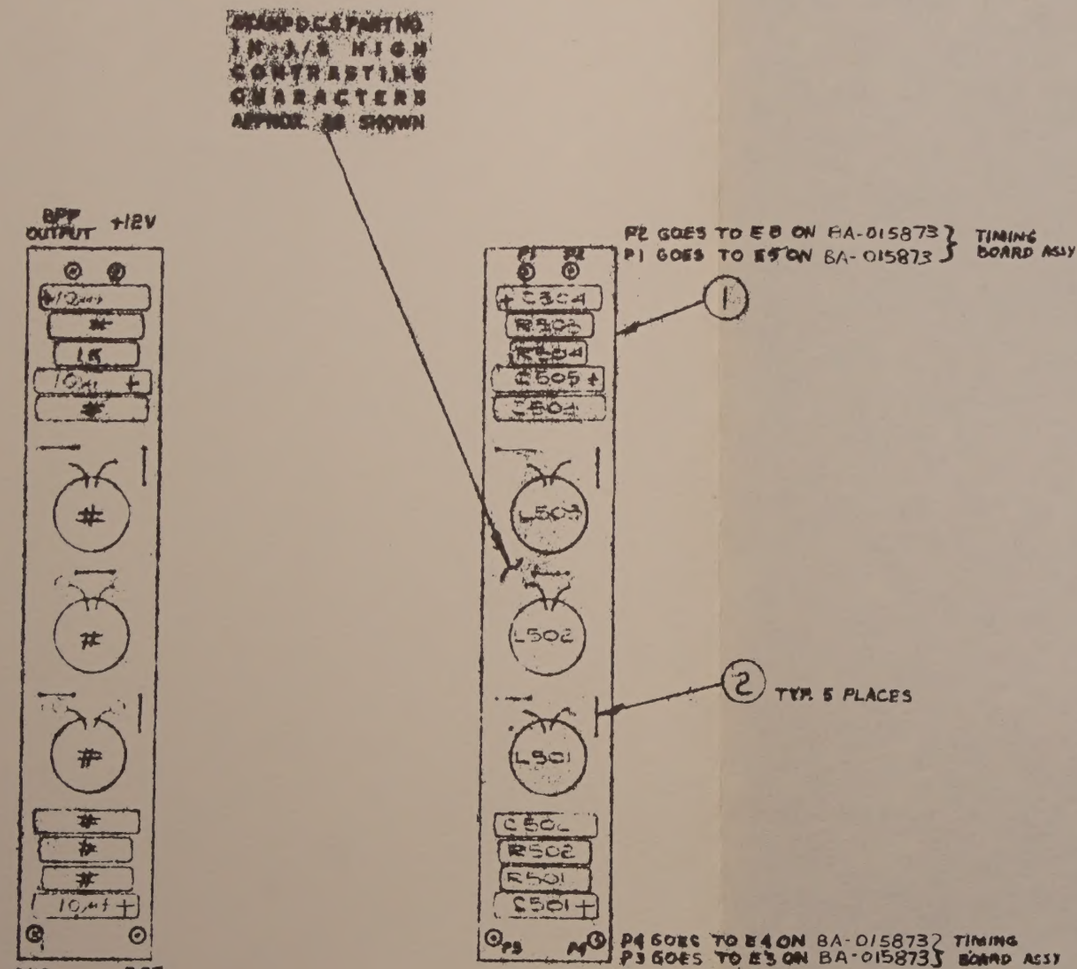
DO NOT SCALE DRAWING
MAT'L
FINISH

XBA-015873 REV. A

SHEET

REV	DESCRIPTION	DATE	DWN.	CHKD	APP.
E					

B



ITEM	SYMBOL	DWG. NO.	DESCRIPTION	QTY / ASSY.
1		BF-014448	BOARD FAB.	
	R501	*	RES, ELECTRA, MF5C, 1/8 JUMPER	
	R502	*	" " 1K	
	R503	*	" " SHORT	
	R504			
	C501		CAP, SPRAGUE, 1500, 20%, 20V, 10µf	
	C502	*	" " 1870 pf	
	C503	*	" " 1870 pf	
	C504		SPRAGUE, 1500, 20%, 20V, 10µf	
	C505		OPEN	
	L501	*	CORE: SIEMENS B65511-H25A40	3
			HARDWARE: MAGNETICS, C-1408-11	3
			BOBBIN: B65512-M2	3
			FLANGE: B65549-J1	3
			CORE SCREW: B65549-A3x10	3
			WIRE: 30 TURNS 99 107mh	3
	L502	*	CORE:	2
			HARDWARE: MAGNETICS, C-1408-11	2
			BOBBIN: SAME AS L501	2
			FLANGE:	2
			CORE & SCREW:	2
			WIRE: 32 TURNS 82 297 mh	1
	L503	*	CORE:	2
			HARDWARE: MAGNETICS, C-1408-11	2
			BOBBIN: SAME AS L501	2
			FLANGE:	2
			CORE & SCREW:	2
			WIRE: 30 TURNS 99 102mh	1
2			JUMPER, #22 BUSS WIRE	5

NOTES:
1) REF. SCHEMATIC GOV-5/F CW-015769
REF. SCHEMATIC GOV-5 GW-015868
2) CAP VALUES PER DCS 81A007, DURA MICA, 1% UP TO 5000 pf.
CAP 5000 pf & UP ARE AMERICAN RAD. TYPE MBPC, MYLAR BLACK PLASTIC CASE, 1%, 50V, CASE SIZES AS BELOW: (2A)
3) TURNS & WIRE SIZES ARE NOMINAL & MAY VARY TO OBTAIN INDUCTANCE VALUE.
4) * = FREQUENCY DETERMINED COMPONENTS.
2A) 5000 pf TO 250 pf, CASE "B"
.250 µf TO 1.0 µf, CASE "A"

PRODUCT	NEXT ASSEMBLY	

DATA CONTROL SYSTEMS, INC.

TITLE BOARD ASSY BPF FREQ UNIT 400 KC ± 6 KC

TOLERANCES UNLESS OTHERWISE SPECIFIED
DECIMAL - 3 PLACE ± .005
DECIMAL - 2 PLACE ± .010
FRAC. ± 1/64 ANG. ± 0°30'
FLATNESS WITHIN .005 IN.
FRACTIONAL HOLES Ø. + 1/64
NOTE: BREAK ALL SHARP CORNERS .005"-.015"
SURFACE ROUGHNESS NOT TO EXCEED

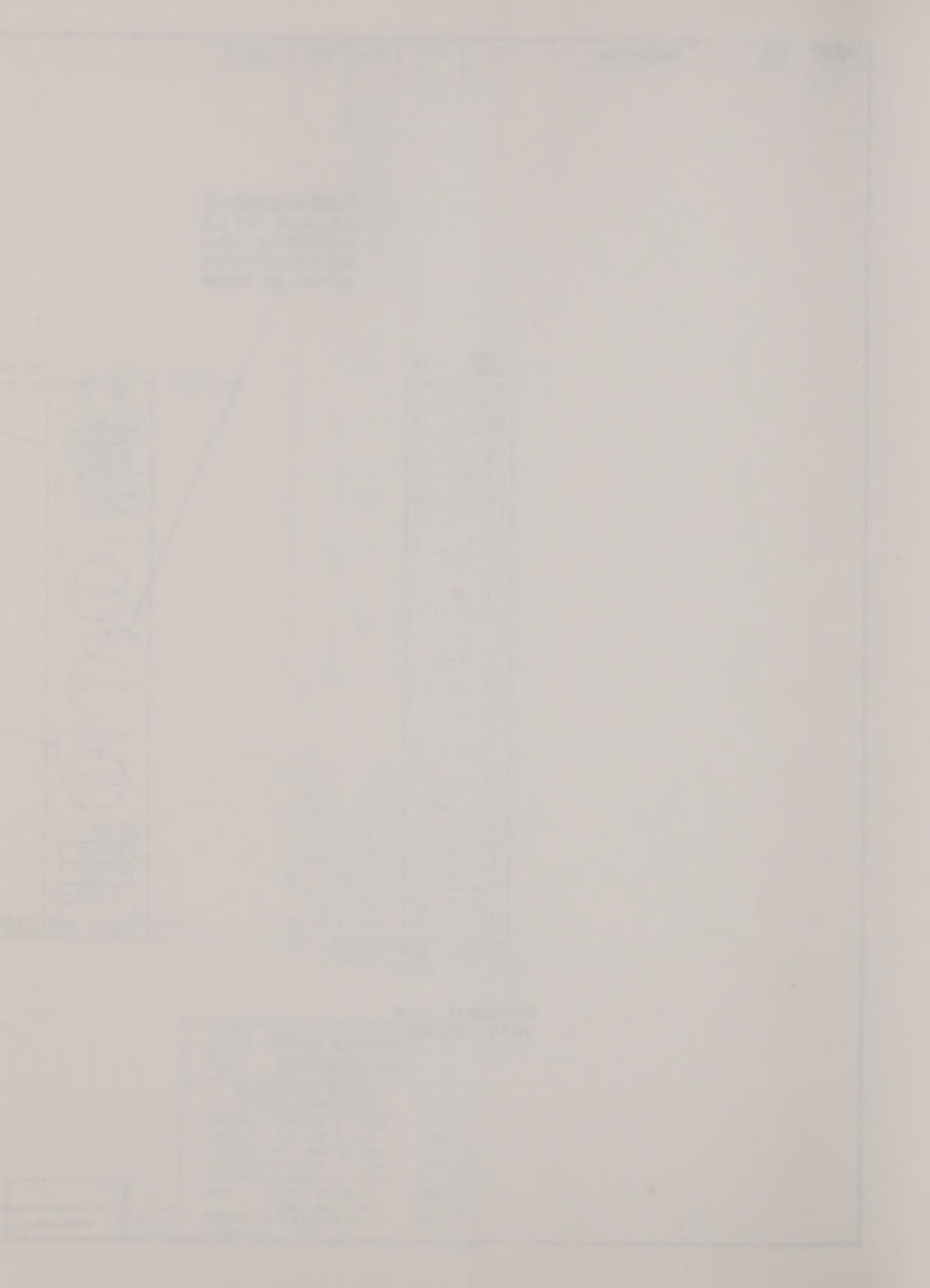
		DATE
DWG	J T	4/
CHKD	9B	5
ENG	RAT	17
APP	RAT	167

SCALE FULL

DO NOT SCALE DRAWING

SIZE A 016025-1 REV B

SHEET



92166